# FINDING BALANCE FOR DUAL-ROLE BOMBERS

BY

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APPROVAL

The undersigned certify that this thesis meets master's-level standards of research, argumentation, and expression.

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The conclusions and opinions expressed in this document are those of the author. They do not reflect the official position of the US Government, Department of Defense, the United States Air Force, or Air University.

## ABOUT THE AUTHOR

Major Ryan ("Hoopty") E. Gorecki received his commission from the United States Air Force Academy (B.S. in Management and Minor in Japanese) in 1998. After graduating from Undergraduate Pilot Training at Columbus AFB, MS, in 2000, he went on to fly the B-52H at Barksdale AFB, LA for the next nine years. Major Gorecki was performing nuclear alert duties on 11 September 2001 at Barksdale AFB. In January 2002 he deployed in support of Operation Enduring Freedom and was overhead in Afghanistan for initial airborne offensive operations during Operation Anaconda where he flew 5 combat sorties. He then upgraded to Aircraft Commander and deployed again in February 2003 in support of Operation Iraqi Freedom and flew 4 combat missions including the first simultaneous, B-1, B-2, and B-52 combat strike in Baghdad. He completed Instructor Pilot upgrade and went on to graduate from the USAF Weapons School in June 2006. Major Gorecki twice deployed to Guam in support of the Pacific Continuous Bomber Presence Mission and flew in exercises over South Korea, Thailand, Japan, Hawaii, and Australia. In 2007, he led the planning effort for, and subsequently deployed briefly to, Darwin Royal Australian Air Base to provide bomber training with Australian F-18s and Joint Terminal Attack Controllers practicing bomb deliveries on Australian ranges. Major Gorecki is an Air Force senior pilot with over 2,600 flying hours in the T-37, T-1, T-38, and B-52H amassing over 317 combat hours in 21 combat sorties. He earned an MBA in Leadership Studies in 2007 from Baker College Center for Graduate Studies and attended Air Command and Staff College where he earned an M.A. in Operational Arts and Sciences. Major Gorecki met his wife while attending pilot training and has two boys, ages 1 and 5. After graduating from the School of Advanced Air and Space Studies on 15 June 2011, he was reassigned to the Pentagon, HAF/A10P—Strategic Deterrence and Nuclear Integration, Planning, Policy, and Strategy Division.

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ABSTRACT

The purpose of this paper is to identify some concepts that nuclear enterprise leaders might choose to use in achieving balance for dual-role strategic bombers. Dual-role bombers face a unique demand of having to maintain a high state of readiness in both the nuclear and conventional missions. In order to identify some useful concepts, this study reviews three eras—the Vietnam conflict, the time between Vietnam and through the Persian Gulf War, and the contemporary time period—in order to discover some methods used by leaders in the past to achieve balance amongst competing requirements.

From 1965 to 1972, B-52 leaders utilized in-theater training to prepare bomber crews for combat. These crews developed and distributed lessons learned, which Strategic Air Command (SAC) incorporated into a specially designed Remote Training Unit created to prepare crews for combat in Southeast Asia. The nuclear mission suffered as resources were siphoned off to support the conflict in Vietnam, but Strategic Air Command was able to replenish some bases with necessary personnel once they were made aware of the difficult demands facing bomber leaders. Fortunately, there was direct transfer between nuclear and conventional weapon skill-sets.

Following Vietnam, the B-52 force acquired additional weapons and missions and achieved balance through the flexible use of training processes. Wing commanders were given the flexibility to tailor training in order to meet critical mission requirements. Unfortunately, despite carrying a conventional mission, not all bombers trained equally to this task, leading to varying levels of success in the Persian Gulf War. Bomber leaders utilized routine unit training, pre-deployment training, and in-theater training to prepare B-52 crews for combat. After the war, SAC was replaced by a new command and a new focus for the expected future use of bombers.

By 2001, the B-52 force went through a revolution in weapon technology that significantly increased its flexibility, responsiveness, and the amount of required training as the overall force drastically shrunk. The B-52 force was prepared to handle its conventional mission, while events in 2007 indicated the focus shifted too far in favor of the conventional mission.

In today's resource constrained environment, leaders must prioritize the missions they intend for bombers to accomplish and allow commanders the flexibility to tailor training to focus on the most complex aspects of the bomber mission. The nuclear mission is the most important mission and should always be fully funded and resourced.

One force structure option for USAF leaders to consider is having one wing of B-52s dedicated to the nuclear mission while utilizing some past training methods to hedge against possible future threats.

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## Introduction

The year 2007 was infamous for the nuclear enterprise beginning with the unauthorized transfer of nuclear weapons aboard a B-52H bomber from Minot AFB, North Dakota to Barksdale AFB, Louisiana. This event, combined with the discovery of errantly shipped intercontinental ballistic missile fusing components, brought the entire nuclear enterprise and its ability to ensure a safe, secure, and reliable deterrent force under close scrutiny. All nuclear bomber wings had passed their limited Nuclear Surety Inspections in 2007 before a command-wide screening of further inspections occurred in 2008. In contrast, these in-depth 2008 inspections revealed an erosion of nuclear safety standards, which were well documented in the reports from the two-part study conducted by the Secretary of Defense Nuclear Task Force on Department of Defense Nuclear Weapons Management and by the Defense Science Board Permanent Task Force on Nuclear Weapons Surety.

These reports highlighted a declining level of experience and oversight within the nuclear enterprise. The majority of report recommendations centered on rebuilding the nuclear enterprise leadership structure, in order to ensure the nuclear mission received its required priority. The reports suggested repeatedly that nuclear enterprise leaders should find a balance between the nuclear and conventional force requirements for the uniquely qualified dual-role strategic bombers. The purpose of this paper is to assist in identifying how nuclear enterprise leaders can achieve that balance.

Balancing means leaders must match requirements against resources in a manner that allows them to complete assigned missions. The easiest way to visualize the balancing act the USAF must perform is using the analogy of a checkbook. Requirements, or bills, must be paid

using available funds. If the bills exceed the available funds, then certain requirements are left uncovered, or unpaid. There are obviously many methods for achieving a balance; one way is to reduce the number, or size, of the bills. Another is to ensure the funds are used in the most efficient manner to cover a wide range of requirements which can take multiple forms. A single dollar can be equally divided amongst every bill; it can be unequally divided to apply a greater amount to more critical bills; or it can be unequally divided to apply a greater amount to the bills which another party designates as the most important. This latter method encompasses the current rebalancing effort in the 2012 budget request by the Office of the Secretary of Defense where "the Department has redirected resources away from lower-priority programs and activities so that more pressing needs could be addressed [in order] to get the most capability from the resources available."[1]

This balancing problem pertains to virtually every organization, and therefore, is not limited to fulfilling nuclear and conventional tasks for dual-role bombers. Limiting the research for this paper to bomber operations helps establish likely solutions to the balancing problem by identifying ideas that have transfer value from one generation to the next. If bomber leadership found a way to balance requirements in the past, it is at least possible that these same methods are applicable to the present

The search for these methods is particularly valuable to the Air Force's newest operational major command, Air Force Global Strike Command. It was formed in response to previous failures of a fragmented nuclear enterprise, and was given the mission of ensuring the credibility of the United States' most powerful deterrent force. This new command is poised to provide the leadership and vision necessary to unite and strengthen the nuclear enterprise, but it must still confront

[1] Department of Defense, *United States Department of Defense Fiscal Year 2012 Budget Request Overview* (Washington DC: Government Printing Office, 2011), 2-3.

the challenge of ensuring the readiness of a bomber force that conducts both nuclear and conventional global strike missions.

The original inspiration for this paper came from personal observations and impressions regarding the readiness of bombers to fulfill their wartime mission. It seems that bomber leaders always found themselves in situations where they had to perform a mission for which they were unprepared. During the Korean War, B-29s conducted close air support to protect the last foothold of United Nations ground forces near Pusan. During the Vietnam conflict, nuclear trained B-52 crews performed close air support and interdiction missions using conventional weapons. During Operation Desert Storm, again, nuclear designated B-52s conducted conventional operations. This theme plays over again in Operations Iraqi and Enduring Freedom. By 2008, after maintaining a conventional focus for nearly 17 years, and under close scrutiny following the unauthorized weapon transfer, the B-52 community was called upon to perform its nuclear mission without fail. If a bomber force could perform its wartime mission, without sacrificing nuclear readiness, then its leaders had found a way to balance requirements.

When Strategic Air Command (SAC) was formed in 1946, it possessed a large bomber force but relatively few nuclear weapons.[2] It had to create a strategic deterrent force from the remnants of aircraft used in World War II. SAC's job was easier given the priority it received to hopefully create a less expensive national deterrent force as the United States demobilized after World War II.

Modified B-29s, called SILVERPLATE bombers, were used by the 509th Composite Group from 1944 to 1950 to deliver nuclear weapons on Japan and then serve as the US's deterrent force following the war.[3] SAC

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[2] Walton S. Moody, *Building a Strategic Air Force* (Washington DC: US Government Printing Office, 1995), 126.
[3] Richard H. Campbell, *The SILVERPLATE Bombers: A History and Registry of the Enola Gay and Other B-29s Configured to Carry Atomic Bombs* (Jefferson, NC: McFarland & Company, Inc., 2005), 2, 8, 22.

found a way to overcome resource scarcity by using a small cadre of bomber aviators to provide the essential deterrent role.[4] As SAC grew, and the target set of potential nuclear enemies likewise grew, SAC created a large deterrent force focused solely on the nuclear mission. From 1965 through 1973, the SAC bomber force was needed in Southeast Asia to fight a conventionally armed enemy (albeit one with nuclear-capable sponsors) utilizing conventional munitions.

Chapter one reveals that even though the nuclear force of B-52s was seemingly unprepared for conventional operations in Vietnam, the once nuclear dominated regime fared exceptionally well. The first deployment of B-52s participated in Arc Light missions and focused on removing the organized Viet Cong threat in South Vietnam. B-52s were used to strike area targets, reminiscent of missions in a nuclear conflict, where precision was not as highly valued given the large destructive capability of B-52 weapons, whether using nuclear or conventional weapons. In fact, the B-52s were exceptionally accurate which paid dividends during the defense of Khe Sanh, where bombers were routinely employed within 1000 meters of friendly troops, and sometimes as close as 500 meters.[5]

As the war in Vietnam progressed, the B-52 force refined its employment procedures and honed its conventional war fighting skills. B-52Ds were outfitted with the Big Belly modification allowing the delivery of 108 bombs. Units deployed to Guam and to U-Tapao, in Thailand, that did not have previous experience flying the D-model, went through a two-week conversion course at Castle AFB, California, where they learned to fly the D-model and practiced conventional tactics. Bomber crews already flying the D-model, as well as some G-model

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[4] Moody, *Building a Strategic Air Force*, 65. The 509th Composite Group only had 20 silver plate B-29s in its inventory capable of delivering nuclear weapons; Campbell, The SILVERPLATE Bombers, 119. There were 15 SILVERPLATE crews.
[5] Robert F. Dorr and Lindsay Peacock, *Boeing's Cold War Warrior: B-52 Stratofortress* (London: Osprey Publishing, 1995), 170.

crews, were sent directly to Southeast Asia to complete local ground training and then flew supervised sorties before being certified to fly in combat. This concept of conducting in-place training was later used in Operation Desert Storm as B-52 crews adjusted employment methods from the SAC-focused low-altitude training to high-altitude bombing.

Chapter two covers the evolution of bomber conventional capabilities, and how those capabilities were used in the Persian Gulf War. In Desert Storm, B-52s primarily targeted strategic targets and ground forces in order to breach Iraqi defenses for the follow-on coalition ground attack. B-52s initially conducted low altitude penetration missions, as they had trained to during the previous 15 years in expectation of flying alone into the Soviet Union to deliver nuclear weapons.[6] In Iraq however, the frontline Iraqi forces were ready for low-altitude attacks and amassed a collection of antiaircraft artillery and surface-to-air missiles to defend them. This drove B-52s to higher altitudes where reduced accuracy revealed deficiencies in pre-war training.

The time period around the Persian Gulf War was important for the dual-role bombers because the force structure was modified to account for the end of the Cold War where future combat scenarios entailed a heavy conventional focus. On 26 September 1991 President George H. W. Bush ordered the end of nuclear alert of SAC bombers.[7] For the next decade, the B-52 force invested considerable energy and resources into improving conventional skills that would benefit the United States in Afghanistan in 2001 and in Iraq in 2003.

Chapter three covers the present era and highlights how bomber training focus adjusted to account for advances in technology and the increasing importance of the conventional mission over the nuclear

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[6] Perry D. Jamieson, *Lucrative Targets: The US Air Force in the Kuwaiti Theater of Operations* (Washington DC: US Government Printing Office, 2001), 88-89.
[7] Dorr and Peacock, *Boeing's Cold War Warrior,* 221.

mission. Both missions became more complex, but this complexity can be mitigated by tailoring training processes and by adjusting inspection criteria to focus on a desired effect.

Chapter four offers recommendations, based on analysis from the preceding chapters, as to how the B-52 force can achieve balance between its two missions. United States Air Force leaders are asking their airmen to find innovative, creative, and efficient ways to deal with complexity and resource limitations. This chapter provides several solutions for reducing mission complexity, providing mission focus through training processes, and possible ways to change the bomber force structure to account for political guidance and mission requirements.

Has the pendulum swung too far in favor of conventional operations over meeting the requirements of nuclear deterrence? The report on the unauthorized weapon transfer incident finds that the issue is not over having nuclear bombers serving in non-nuclear contingencies, but the issue is "the balance and the attitude."[8] Correcting this balance and attitude requires "restoring full attention to the rapid response nuclear deterrent bomber commitment."[9] Establishing the appropriate organization and vision for the nuclear enterprise are two key tasks needed to restore attention. These topics have already been covered by previous research papers.[10] The analysis contained in this research paper will determine common characteristics between Vietnam, Operation Desert Storm, and the present while looking at bomber

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[8] Gen Larry D. Welch, USAF (ret), *Defense Science Board Task Force on Nuclear Weapons Surety, Report on the Unauthorized Movement of Nuclear Weapons* (Washington, DC: Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, April 2008), 12.

[9] Welch, *Report on the Unauthorized Movement of Nuclear Weapons*, 12.

[10] See Tyrell A. Chamberlain, "Transition of the B-52 bomber from SAC to ACC: a case study of transformation." School of Advanced Air and Space Studies Thesis, Air University, 2006; John J. Bleil, "Roadmap for a New Command: lessons from strategic air command and air combat command." School of Advanced Air and Space Studies Thesis, Air University, 2009.

training to identify potential methods for achieving a balanced dual-role bomber force. In studying these periods of history, it is important to identify common characteristics to see how previous commanders dealt with balancing a force. The most important feature in a balancing equation is the national priorities espoused in policy statements.

## Chapter 1

## Vietnam

The use of B-52s in Vietnam was originally restricted by the fear of escalating a proxy conflict during the Cold War. Over time, massive firepower, including the use of B-52s, came to be seen as the only option remaining for a president who had vowed to end the conflict and return legitimate authority to the South Vietnamese government. As a result of changes in national policy, Strategic Air Command (SAC) adjusted its training and force structure to support conventional bombing missions in Vietnam, while also maintaining nuclear proficiency.

### Arc Light and B-52Fs

SAC was opposed to using its nuclear bombers in a gradualist fashion during the conflict in Vietnam, primarily due to the requirements of its priority mission, providing nuclear deterrence with 30 percent of its bombers on 15-minute alert. In 1957, SAC had determined that roughly 15 minutes were required to launch its nuclear forces before the recently developed Soviet intercontinental ballistic missiles would strike their targets in the continental United States.[1] By May 1960, SAC had achieved its goal of placing one-third of its nuclear force on ground alert, and then nearly one year later, President Robert F. Kennedy called for "one-half of SAC's B-52s and B-47s to be placed on 15-minute ground alert."[2] SAC had to fulfill its nuclear mission first but was not opposed to using bombers in Vietnam, so long as they were used in a decisive manner, in contrast to President Lyndon B. Johnson's incremental application of air power in Operation Rolling Thunder.

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[1] J.C. Hopkins and Sheldon A. Goldberg, *The Development of Strategic Air Command*, 1946-1986 (Offutt AFB, NE: Office of the Historian, Headquarters Strategic Air Command, 1986), 65.
[2] Hopkins and Goldberg, *The Development of Strategic Air Command*, 92, 104.

There were several reasons why SAC needed its bombers for the nuclear deterrence mission. First and foremost, by using B-52s in Vietnam, SAC leadership believed it would jeopardize a pillar of the nation's deterrent force. The loss of a B-52 in Vietnam would have seriously damaged the credibility of the deterrent force, if the same tactics (and especially electronic countermeasures) used in Vietnam were the ones to be utilized during a nuclear conflict with the Soviets. A second reason is that SAC "feared that its crews would lose their skill at flying low-level missions of the kind envisioned for a nuclear war with the Soviet Union."[3] A third reason was the need to preserve a second-strike capability to match the Soviet nuclear threat, which had recently achieved parity with the United States.[4] Based on expected attrition in a nuclear exchange, SAC could not afford to waste any of its nuclear bombers in a conventional conflict if it hoped to achieve its strategy of Mutually Assured Destruction.[5] SAC was concerned that a reduced force of nuclear bombers would be vulnerable to Soviet interceptors and missiles and thus would not reach its target.[6] As deterrence theorist Bernard Brodie notes, a second-strike force requires "saturation" of enemy airspace to overcome an alerted defense system.[7]

SAC fielded 588 B-52s and 81 B-58s,[8] of which 528 B-52s and 75 B-58s were assigned nuclear targets under the existing nuclear war plan, leaving roughly 60 uncommitted B-52s that could be used for other

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[3] Wayne Thompson, *To Hanoi and Back: The USAF and North Vietnam, 1966-1973* (Washington, DC: Air Force History and Museums Program, 2000), 10.
[4] Memorandum from General Power to the SAC alert force in 1957; see Henry M. Narducci, Strategic Air Command and the Alert Program: A Brief History, Office of the Historian, Headquarters SAC, 1 April 1988, 32-33; Warren A. Trest, *Air Force Roles and Missions: A History* (Washington, DC: Air Force History and Museums Program, 1998), 168.
[5] L. Douglas Keeney, *15 Minutes: General Curtis Lemay and the Countdown to Nuclear Annihilation (*New York, NY: St. Martin's Press, 2011), 39, 59, 251, 260.
[6] Keeney, *15 Minutes*, 3.
[7] Bernard Brodie, *Strategy in the Missile Age* (Santa Monica, CA: RAND Corporation, 2007), 288-289.
[8] Hopkins and Goldberg, *The Development of Strategic Air Command*, 144.

missions, assuming all aircraft were operable.[9] Between 1958 and 1959, SAC acquired 89 B-52Fs which had a unique pylon system that could easily adapt to carry conventional bombs.[10]

B-52Fs were the only aircraft that were initially available, capable, and planned for use in Vietnam. SAC Operational Plan (OPLAN) 52-65 was issued mid-1964 and established the Arc Light framework, employing a task force structure of 33 B-52Fs carrying conventional weapons which could quickly reconfigure for nuclear employment if necessary.[11] Under Project South Bay, B-52F pylons used for carrying the stand-off nuclear Hound Dog missile were adapted to carry conventional-capable multiple ejector racks, thus giving the aircraft a 51-bomb carriage capability.[12] The plans for using the bombers were as dynamic as those formulating national policy for the war effort.

There were several differing views on how to use the B-52s that influenced President Johnson. Secretary of Defense Robert S. McNamara thought B-52s should support the army fighting an insurgency in South Vietnam, a view also supported by the ground commander, General William C. Westmoreland, Military Assistance Command, Vietnam (MACV).[13] The State Department, like President Johnson, was concerned that using B-52s in Vietnam was a sign of escalation and could risk the outbreak of a larger war, possibly nuclear, with the Soviet Union.[14] General Curtis E. LeMay, Chief of Staff, United States Air Force (CSAF), thought B-52s should heavily bomb critical nodes in North Vietnam

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[9] Keeney, *15 Minutes*, 316.
[10] Robert F. Dorr and Lindsay Peacock, *Boeing's Cold War Warrior: B-52 Stratofortress* (London, UK: Osprey Publishing, 1995), 237; Jon Lake, *B-52 Stratofortress Units in Combat 1955-73* (Oxford, UK: Osprey Publishing Ltd., 2004), 20.
[11] Warren A. Trest, *USAF SAC Operations in Support of SE Asia – Special Report*, Call # K717.0413-97, IRIS # 01103489 (Maxwell AFB, AL: USAF Collection, AFHRA, December 1969), *x*, 17-18.
[12] Lake, *B-52 Stratofortress Units in Combat*, 16, 20-21.
[13] Gen William W. Momyer, *Airpower in Three Wars (WWII, Korea, Vietnam)* (Maxwell AFB, AL: Air University Press, 2003), 23-24; Alwyn T. Lloyd, *A Cold War Legacy: A Tribute to Strategic Air Command-1946-1992* (Missoula, MT: Pictorial Histories Publishing Company, Inc., 2000), 357-358.
[14] Lake, *B-52 Stratofortress Units in Combat*, 22.

since that was the source of the problem according to his doctrine that a country fully commit to the war effort after making a decision to fight.[15] General Thomas S. Power, the commander of SAC, likely held the same view, given that he was mentored by General LeMay and held a similar, if not even more robust, view on the use of airpower. Stephen Budiansky captures General Power's views in an exchange with a RAND Corporation researcher trying to sell the general on a "counterforce," versus SAC's "maximum effort," nuclear strategy in 1960, a strategy General Powers saw as limiting. "'Why do we want to restrain ourselves?' Power shouted. 'Restraint! Why are you so concerned with saving *their* lives? The whole *idea* is to kill the bastards! Look, at the end of the war, if there are two Americans and One Russian, we win!'"[16]

In response to the Viet Cong attack on the MACV compound at Pleiku on 7 February 1965, President Johnson directed Admiral Ulysses S. Grant Sharp, Jr., commander of US Pacific Command (PACOM), to attack four of the targets in North Vietnam that he previously included as options for the president.[17] At the same time, and as a "precautionary measure, the JCS directed … thirty B-52s for conventional bombing" to prepare for deployment.[18] Four days later, 15 B-52Fs from the 320th Bombardment Wing (BW) and 15 B-52Fs from the 2 BW deployed to Guam as the contingency force established in SAC's OPLAN 52-65.[19] The planes were loaded with both conventional and nuclear weapons.[20] This shows that SAC still regarded these bombers as critical to their primary mission, strategic nuclear warfare against the Soviet Union. If "the balloon went up," if a nuclear operation were needed, the planes would

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[15] Warren Kozak, *Lemay: The Life and Wars of General Curtis LeMay* (Washington, DC: Regnery Publishing Inc., 2009), 306, 339-341.
Stephen Budiansky, *Air Power: The Men, Machines, and Ideas That Revolutionized War, from Kitty Hawk to Iraq* (New York, NY: Penguin Group (USA) Inc., 2005), 366.
[17] Jacob Van Staaveren, *Gradual Failure: The Air War Over North Vietnam 1965-1966* (Washington, DC: Air Force History and Museums Program, 2002), 9-15.
[18] Staaveren, *Gradual Failure*, 15.
[19] Lloyd, *A Cold War Legacy*, 357.
[20] Lloyd, *A Cold War Legacy*, 383.

launch and jettison the conventional weapons in the ocean.[21] If a conventional attack was called for, the nuclear weapons were downloaded, and the planes launched on their mission.[22] In order to retain command of the bombers for the purposes of the nuclear mission, SAC was given operational control of the bombers instead of Admiral Sharp at PACOM, who held operational control over all other forces. The contingency force was finally put to use four months later, on 18 June 1965, when it flew the first B-52 combat mission in Southeast Asia, executing the Arc Light mission.[23]

The B-52Fs initially achieved abysmal results, but managed to improve before leaving the theater. During the first Arc Light mission, two B-52s collided while preparing for in-flight refueling, and the rest placed only half of their bombs in the target area "kill[ing] two enemy soldiers and destroy[ing] 40 'barracks' buildings, a communications centre and a rice store," at a cost of $20 million.[24] The B-52s did not fly again for another month. Throughout later sporadic employment opportunities, the crews became more familiar with using the aircraft's radar to pinpoint locations in the virtually featureless terrain of Vietnam.[25] By December, this familiarization had paid off when B-52s were requested for close air support near Da Nang to support marine ground forces. General Lewis W. Walt, who requested and then observed the 12 December 1965 attack, wrote to SAC's commander General John D. Ryan: "We are more than impressed with the results. We are delighted. The timing was precise, the bombing accurate and the overall effects awesome to behold. The enemy has abandoned his prepared

[21] Lloyd, *A Cold War Legacy*, 383.
[22] Lloyd, *A Cold War Legacy*, 383.
[23] Lake, *B-52 Stratofortress Units in Combat*, 24.
[24] Lake, *B-52 Stratofortress Units in Combat*, 25.
[25] Dorr and Peacock, *Boeing's Cold War Warrior*, 131.

positions and much of his equipment in great confusion, and this is making our part of the job easier."[26]

The ground commanders were pleased with B-52 strikes and wanted to use them more frequently. However, SAC had no more B-52Fs and had to turn to B-52Ds, which were specifically modified for conventional operations. By April 1966, all F models were replaced by D models which had completed a Big Belly modification to carry a grand total of 108 bombs.[27] For the F-model, the planes were modified, filled a need, and were deployed to fight a war. However, the crews were not properly trained and only achieved success by gradually developing their own skills in combat.[28]

**The Expanding Big Belly Mission**

President Johnson wanted to keep attention on developing his Great Society social programs instead of the conflict in Vietnam. He intended to do this by limiting the US ground presence in South Vietnam, while attempting to coerce the north through a carrot-and-stick approach. Neither of these approaches was working. By the summer of 1965, General Westmoreland was clamoring for more troops to "survive the communist thrust" resulting in a "ground troop strength of 175,000 and an activation of 100,000 army reservists."[29] President Johnson's bombing halt over Christmas 1965, suggested by McNamara, also failed to encourage the north to settle for a secure peace and to cease supporting the Viet Cong.[30] North Vietnam's January letter to the Pope calling the bombing halt a "sham peace trick [made the president] listen

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[26] Lake, *B-52 Stratofortress Units in Combat*, 26.
[27] Dorr and Peacock, *Boeing's Cold War Warrior*, 132.
[28] Keeney, *15 Minutes*, 298. In March 1964, SAC conducted limited conventional release experiments with B-52Fs at Eglin AFB, Florida so as to not "lose its relevance."
[29] Mark Clodfelter, *The Limits of Airpower: The American Bombing of North Vietnam* (Lincoln, NE: University of Nebraska Press, 2006), 68-69.
[30] Clodfelter, *The Limits of Airpower*, 90-91.

more intently to his military chiefs' call for 'dramatic' air raids," instead of the failed counsel of his civilians.[31]

These two factors, more troops and an expanded air campaign, were pivotal in expanding the role of B-52s in Vietnam. The first test for the Big Belly B-52D came on 12 April 1966, when 30 aircraft dropped delayed-action fused 750- and 1,000-pound bombs on Mu Gia Pass.[32] The B-52 bombing temporarily halted the flow of Vietnamese logistics by causing massive landslides that left Mu Gia Pass unusable without further repairs. The tremendous result of this operation prompted General Westmoreland to request another attack which went even "more smoothly [since] SAC aircrews possessed better targeting data, the operational aiming points were more easily identified, and all of the aircraft delivered their ordnance as planned."[33] From December 1964 through September 1967, all B-52Ds were converted to the Big Belly modification to facilitate their growing demand following successes like the attack on Mu Gia Pass.[34] To meet the increase in monthly sorties, from 400 to 600, SAC had to enlarge its pipeline of aircrew and ground support, and establish another air base in the theater.[35] SAC also had to ensure aircrews were trained properly to support this increased commitment.

**Training the Bomber Force**

D-model training for Southeast Asia came in two forms. D-model wings, and later G-model wings, deployed straight to Guam and then received in-place training from the outgoing unit. As deployments adjusted to a schedule that moved individual aircrews, versus whole unit swaps, specific crew members were designated to certify a crew before they could fly on combat missions. SAC's other method for training

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[31] Clodfelter, *The Limits of Airpower*, 92.
[32] Staaveren, *Gradual Failure*, 260.
[33] Staaveren, *Gradual Failure*, 261.
[34] Hopkins and Goldberg, *The Development of Strategic Air Command, 132, 145.*
[35] Staaveren, *Gradual Failure*, 232.

aircrew to support the mission in South Vietnam was a Replacement Training Unit (RTU) established at Castle AFB, California to train other B-52 model crews to fly the B-52D.

Guam's bomber commanders confirmed the efficiency of their training process and why the nature of the bombing activity was easily transferable from units trained in nuclear operations. Col Lester E. Gunter was the 3rd Air Division Deputy Chief of Staff for Operations on Guam from June 1965 to July 1967 and explained that crew changeovers took 10 days.[36] During this period the outgoing crew provided ground training and then allowed the new crew to observe an over-the-shoulder sortie with the outgoing crew.[37] Then the two crews would swap roles, and the new crew was observed and certified for combat by the outgoing crew.[38] Col Alvin R. Fortney, the 3960 Strategic Wing's vice-commander on Guam from July 1966 to July 1968, confirmed the success of this routine, noting that crews were ready for the mission, especially since they were given the job to attack area targets.[39]

B-52s attacked area targets, instead of precise buildings or locations, so they were quite accurate given the large target area. The standard three-ship cell of B-52s adopted a "wedge angle" tactic to saturate the target box, within which the two wingmen offset by 500 feet from the lead aircraft's bombing track line and released their weapons simultaneously with the lead aircraft, filling a 1 x 1 km, 1 x 2 km, or 2 x 6 km target grid.[40] Colonel Gunter, not surprisingly, attributed their successes to SAC's standardization of aircrew and ground crew training

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[36] Oral History Interview of Col Lester E. Gunter, Call # K239.0512-176, IRIS # 00904018, (Maxwell AFB, AL: USAF Collection, AFHRA, 9 August 1968), 1, 21.
[37] Oral History Interview of Col Lester E. Gunter, 21.
[38] Oral History Interview of Col Lester E. Gunter, 21.
[39] Oral History Interview of Col Alvin Fortney, Call # K239.0512-1532 C. 1, IRIS # 01053056, (Maxwell AFB, AL: USAF Collection, AFHRA, 23 August 1968), Frame 62.
[40] Trest, *USAF SAC Operations in Support of SE Asia*, 27; Oral History Interview of Col Lester E. Gunter, 26.

through its "repetitive exposure" training model.[41] General LeMay's experiences from World War II taught him that people need consistent exposure to meeting high performance standards in order to overcome the confusion of adopting a new mission, and to thwart peacetime complacency.[42]

Another factor contributing to the success of bombing in Vietnam was the use of COMBAT SKYSPOT radar ground stations serving two roles. First, the SKYSPOT sites served as radar beacons, which aircraft used as offset aiming points in the featureless jungle terrain. SKYSPOT crews could also vector aircraft to the precise bomb release point and provide a verbal release command to place bombs within "1,000 yards of friendly troops" and even closer based on system tests.[43] This capability proved incredibly valuable in breaking the siege of Khe Sanh.

**The Training Pays Off**

By 1968, the insurgency in South Vietnam turned hot as the North Vietnamese Army (NVA) "launched a major offensive … to capture the main provincial capitals in South Vietnam."[44] The monthly sortie count for B-52s rapidly soared as General Westmoreland's operations absorbed the bomber sorties as fast as they were produced. The sortie count peaked in February 1968 at 1,800 per month, lasting through July, before reducing to a steady 1,400 per month through the end of 1969.[45] From 22 January to 31 March 1968, 2,500 B-52 sorties flew in support of Operation Niagara, the air operation dedicated to the defense of Khe Sanh, with "devastating accuracy," utilizing a combination of saturation grid targeting, easily adopted by the marines, and COMBAT SPYSPOT

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[41] Oral History Interview of Col Lester E. Gunter, 33-34; 93d Bombardment Wing (Heavy) History, Jul – Sep 1968, Call #K-WG-93-HI, Vol.1, IRIS # 00452818, (Maxwell AFB, AL: USAF Collection, AFHRA, 1968), 51.
[42] Harry R. Borowski, *A Hollow Threat: Strategic Air Power and Containment Before Korea* (Westport, CT: Greenwood Press, 1982), 165.
[43] Staaveren, *Gradual Failure*, 267.
[44] Lake, *B-52 Stratofortress Units in Combat*, 47.
[45] Lloyd, *A Cold War Legacy*, 410, 414.

precision guidance, permitting whatever proximity of damage that was deemed most necessary by the ground commander.[46] MACV lacked a credible means, in many cases, to fully ascertain the battle damage following B-52 strikes. However, some post-target analysis showed incredible damage, corroborated by B-52 crewmember reports of secondary explosions. In summary, MACV interpreted: "It is evident … that B-52 strikes have destroyed numerous enemy offensive/defensive positions [around Khe Sanh] and disrupted supply and storage areas. Other evidence shows that the enemy has also suffered many casualties to these attacks. [The effect of the bombing left the impression that it] was a storm of bombs and ammunition which eradicated all living creatures and vegetation whatsoever, even those located in caves or in deep underground shelters."[47]

Interrogations of captured NVA fighters revealed that the enemy hoped to benefit from close air support restrictions that limited attacks to within 1000 meters of friendly troops by remaining within 300 to 600 meters of US positions.[48] The USAF was ready to discount the B-52 effects of bombing NVA and Viet Cong jungle paths during interdiction missions, because they learned that bombs were detonating upon impact with the trees.[49] However, interrogators further discovered the enemy particularly feared these fragmentation bomb attacks.[50] A B-52 crewmember, who flew in Operation Niagara, was surprised one day to hear a marine say that bombs had fallen within 500 meters of friendly troops:

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[46] Warren A. Trest, *Khe Sanh (Operation Niagara) 22 January – 31 March 1968 – Special Report*, Call #K717.0413-35, (Maxwell AFB, AL: USAF Collection, AFHRA, September 1968), 1, 67, 70, 71.
[47] Trest, *Khe Sanh*, 91-92.
[48] Project CHECO Southeast Asia Report, Khe Sanh (Operation Niagara) – Supporting Documents, Call # K717.0413-35 V.2, IRIS # 00904970, (Maxwell AFB, AL: USAF Collection, AFHRA, 1968), 262.
[49] Dorr and Peacock, *Boeing's Cold War Warrior*, 141; Lake, *B-52 Stratofortress Units in Combat*, 26.
[50] Project CHECO Southeast Asia Report, Khe Sanh (Operation Niagara) – Supporting Documents, 238.

> 'No that's not possible. We came in with your guidance with great care. We slowed down to put our bombs where we were told.'
> The Marine looked at [him] and said,
> 'Yeah, but *we lied to you*. We brought you in to 500 meters and *didn't tell you*, because the VC … figured out that you were supposed to come no closer than 1000 meters.'[51]

**Training the Surge Force**

To meet the sustained 1,400 sortie per month requirement in South Vietnam, SAC established the Replacement Training Unit (RTU) at Castle AFB, California on 15 April 1968 in order to transition F-, G-, and H-model crews into the B-52D.[52] The airmen at the base found themselves confronted with a grueling set of competing training requirements, a training schedule that reached a breaking point in 1969. Vietnam kept the 93d Bomb Wing (BW) at Castle AFB gainfully employed, while also draining away the resources the wing needed to produce B-52 crews to fight the war.

The wing had a two-fold mission—assuring the readiness of its forces for the nuclear mission and supplying fresh B-52 aircrews to SAC bases across the United States. Under the nuclear banner, its two operational squadrons practiced dispersal exercises in preparation for the wartime commitment. On the training side, it was responsible for preparing crews heading to Southeast Asia, as well as the normal pipeline of students receiving initial certification and upgrade training in the B-52. The most critical element in building a successful air force has usually been a regular supply of crewmembers to fly the aircraft. A chief reason for the Luftwaffe's failure in World War II was its inability to sustain a cadre of highly trained pilots in the face of combat attrition.[53]

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[51] Dorr and Peacock, *Boeing's Cold War Warrior*, 170.
[52] Hopkins and Goldberg, *The Development of Strategic Air Command, 152.*
[53] James S. Corum, *The Luftwaffe: Creating the Operational Air War, 1918-1940* (Lawrence, KS: University Press of Kansas, 1997), 269; 285; Richard J. Overy, *The Air War, 1939-1945* (London, UK: Europa Publications, Ltd., 1980), 81; Williamson Murray and Allan R. Millett, eds., *Military Innovation in the Interwar Period* (New York, NY: Cambridge University Press, 1996), 137.

Unfortunately, the 93 BW was just as susceptible as any other SAC bomber wing and suffered when it had to send both air and ground crew piecemeal to Southeast Asia, since the USAF abandoned the whole-unit swap process.

SAC crews going through the RTU were given one week of academic training and one week of flight training, in which they received three B-52D sorties teaching aircraft differences, conventional weapons employment, and evasive tactics for defeating surface-to-air missiles.[54] They modeled their training on a typical Arc Light sortie flown from Guam and even had 3d Air Division training officers from Guam visit and assess the training of the RTU.[55] In general, the observers deemed the training "very effective."[56] Upon arriving in Guam, the crews received their last official ground training course by completing the SAC Contingency Aircrew Training (SCAT) program, which taught "role- and theatre-specific techniques and procedures."[57] The wing's other training unit, the 4017th Combat Crew Training Squadron (CCTS), produced B-52 crews and instructors through a 12-sortie syllabus. In early-1968, the CCTS instructors noticed a perceptual decline of experience in aircrews attending the course, since B-52 certification had previously only required five sorties.[58]

By 1969, the siphoning effect of Vietnam was beginning to take its toll on the wing's primary mission, as maintenance manning dropped from its fully healthy level in the summer of 1968 to subsequently lower numbers—84 percent, then 79 percent, and finally, less than 65 percent by October 1969, a pivotal month for the wing and for 15 AF commander

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[54] 93d Bombardment Wing (Heavy) History, Apr – Jun 1969, Call # K-WG-93-HI V.1, IRIS # 00452824, (Maxwell AFB, AL: USAF Collection, AFHRA, 1969), 57.
[55] 93d Bombardment Wing (Heavy) History, Jan –Mar 1970, Call # K-WG-93-HI V.1, IRIS # 00452832, (Maxwell AFB, AL: USAF Collection, AFHRA, 1970), supporting documents exhibit 58.
[56] 93 BW (Heavy) History, Jan –Mar 1970, supporting documents exhibit 58.
[57] Lake, *B-52 Stratofortress Units in Combat*, 49.
[58] 93d Bombardment Wing (Heavy) History, Jul –Sep 1968, 49-50.

Lt Gen Paul K Carlton.[59] In the summer of 1969, the wing commander alerted 15 AF and SAC that diminished maintenance manning was beginning to affect flying operations and his ability to train B-52 crews. On 8 October 1969, after General Carlton arrived at Castle AFB with his Staff Assistance Visit (SAV) team to analyze the maintenance manning problem, a B-52 crashed, with the general observing the incident from the ramp, just after exiting his own airplane.[60]

In an unprecedented move, General Carlton asked every Castle AFB instructor pilot to send him a personal letter with his own diagnosis of the causes for the rash of crashes, which had culminated with the October mishap on the day of the general's visit. The responses all seemed to center on one main theme—they were too busy. The pilots said they were overworked having to push additional student lines, despite a decrease in sortie production.[61] They also thought that they spent too much time on SAC-specified ancillary training and memorizing regulations, and also thought they should be given more latitude when handling aircraft emergencies, instead of the preferred SAC hotel-conference system.[62] These inputs would later lead to another historic achievement for SAC, when all B-52 instructors gathered for a SAC-wide tactics conference aimed at fixing some of the long-term problems with B-52 training, employment, and resourcing. As the SAV team was preparing to leave, their immediate recommendation was for the wing to

[59] 93d Bombardment Wing (Heavy) History, Jul –Sep 1968, 1-28; 93d Bombardment Wing (Heavy) History, Jan – Mar 1969, Call # K-WG-93-HI V.1, IRIS # 00452822, (Maxwell AFB, AL: USAF Collection, AFHRA, 1969), 1-30; 93d Bombardment Wing (Heavy) History, Apr-Jun 1969, 1-31; and 93d Bombardment Wing (Heavy) History, Oct – Dec 1969, Call # K-WG-93-HI V.1, IRIS # 00452828, (Maxwell AFB, AL: USAF Collection, AFHRA, 1969), supporting documents exhibit 115.
[60] 93d Bombardment Wing (Heavy) History, Oct – Dec 1969, 1-50.
[61] 93d Bombardment Wing (Heavy) History, Oct –Dec 1969, appendix-all.
[62] 93d Bombardment Wing (Heavy) History, Oct –Dec 1969, appendix-all. The hotel-conference was a telephone consult system to patch the crew on the emergency aircraft to wing operations, then the appropriate air division, then the numbered air force, and finally straight into the depths of SAC itself. Each time a new party joined the conference, the crew found themselves explaining the same problems to a new set of listeners while awaiting authority to safely land the aircraft. They understandably found this process too restrictive and intruding on safety of flight.

maintain manning levels at 65 percent for E-6s and above, while General Carlton vowed to fix the problem with SAC.[63] In less than six months, the wing found its maintenance shortages had "nearly disappeared" with an accompanying 130 percent increase in RTU student production, and a 149 percent increase in CCTS student production.[64] These students found themselves flying Arc Light missions from Guam and from U-Tapao Air Base in Thailand, which had been opened in 1967 to host the growing force of B-52Ds.

The 1968 North Vietnamese TET offensive carried serious repercussions for America's involvement in Vietnam, since it confirmed that the bombing in North Vietnam had failed to stem the flow of men and supplies into the south. For President Johnson, it seemed to be the death knell for his failed gradual approach of applying coercive airpower. On 31 March 1968, he announced the de-escalation of American bombing, except against areas in the south where enemy troops threatened friendly forces.[65] When President Richard M. Nixon came into office in 1969, he chose to use B-52s in a secret bombing campaign in Cambodia, which kept the bomber force heavily occupied in two major arenas in the war.[66]

As compared to the earlier F-model experience, the B-52Ds fared better in Southeast Asia because of three key factors. First, SAC ensured that vital combat lessons were shared amongst the bomber crews through its in-theater indoctrination training process. Second, SAC provided a successful targeting system designed to improve the aircraft's lethality. Finally, the command corrected deficiencies in its training system, during operations, in order to maintain a steady flow of aircrew to the front. Yet again, North Vietnam would test the resolve of America's

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[63] 93d Bombardment Wing (Heavy) History, Oct –Dec 1969, supporting documents exhibit 115.
[64] 93d Bombardment Wing (Heavy) History, Apr –Jun 1970, Call # K-WG-93-HI V.1, IRIS # 00452834, (Maxwell AFB, AL: USAF Collection, AFHRA, 1970), xii.
[65] Clodfelter, *The Limits of Airpower*, 114.
[66] Thompson, *To Hanoi and Back*, 163-164.

leadership by launching a surprise attack in 1972, and again make a strategic miscalculation as to how far a president would go to end the conflict.

**Linebacker and Maximum Aggressiveness with the B-52D and B-52G**

On 30 March 1972, North Vietnam launched the last of its major offensive thrusts into South Vietnam near the demilitarized zone and just north of Saigon, triggering a massive US response.[67] Within a few days, President Nixon cleared away the military's perceived existence of restrictions on the use of air power, stating "I don't think anybody realizes how far I am prepared to go to save this … we have no option but to win this … whatever is necessary to stop this thing has to be done."[68] He challenged his chief military advisor to make the USAF accept more risk in dealing a punishing blow to the north. The Bullet Shot operation that moved state-side B-52s to the Southeast Asia Theater, rapidly exhausted the supply of B-52Ds, so SAC had to send B-52Gs in order to fulfill the requirements levied by the chairman, Admiral Thomas H. Moorer.[69] By the time the Easter Offensive kicked off on 30 March 1972, President Nixon had already ordered a reduction in the number of ground troops in Vietnam to close to 69,000 in order to achieve his "Vietnamization" policy of "honorable' withdrawal" and a return of legitimate control to the leaders of the south.[70] This meant that any significant combat capability could only come from his rapidly deployable USAF and USN assets.

B-52Gs and Hs had previously been retained by SAC to fulfill the nuclear deterrence mission, while a majority of other SAC bombers, B-52Ds, were deemed necessary for the conflict in Southeast Asia. As such, the crews flying these planes had seen no specialized training for

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[67] Stephen P. Randolph, *Powerful and Brutal Weapons: Nixon, Kissinger, and the Easter Offensive* (Cambridge, MA: Harvard University Press, 2007), 61.
[68] Randolph, *Powerful and Brutal Weapons*, 93.
[69] Randolph, *Powerful and Brutal Weapons*, 108-109.
[70] Clodfelter, *The Limits of Airpower*, 148-149.

the conventional mission in Vietnam, only the normal training acquired while going through SACs CCTS course at Castle AFB and the subsequent mission-specific training the crews received upon arriving at their final SAC bases. Of course, this training focused on the nuclear mission and sitting nuclear alert. However, SAC was able to accept more risk in allocating additional B-52s for use in Vietnam, because its nuclear ballistic missile force had steadily grown to surpass the number of bombers.[71] One of those B-52G crewmembers related his Vietnam experience in a military staff paper, after surviving a shoot-down early in Operation Linebacker II, the decisive bombing campaign that targeted Hanoi and Haiphong harbor.

Robert Clement completed his CCTS training at Castle AFB, and then went to Loring AFB for his follow-on assignment, where he quickly completed mission qualification training by November 1972.[72] His CCTS training consisted of a reduced 10-flight certification in B-52Fs, before receiving G-specific training at Loring.[73] Within weeks of completing this training, he by-passed the 10-day RTU training, heading straight to Guam since President Nixon wanted to "bomb the bastards" after his October 1972 bombing pause failed to induce the North Vietnamese negotiating team to reach an agreement.[74]

B-52s helped President Nixon achieve his political objectives by bombing the North Vietnamese with punishing devastation, leaving them no other option than to finalize details in a peace agreement. The individual success of the B-52 was difficult to measure, given the technology of the day. Without having adequate battle damage assessment of targets in North Vietnam, SACs leaders had to rely on

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[71] Hopkins and Goldberg, *The Development of Strategic Air Command, 126.*
[72] Maj Robert A. Clement, "A Fourth of July in December: A B-52 Navigator's Perspective of Linebacker II." (Maxwell AFB, AL: Air University Press, March 1984), 10-12.
[73] Clement, "A Fourth of July in December," 5.
[74] Lake, *B-52 Stratofortress Units in Combat*, 61-62; Clement, "A Fourth of July in December," 5.

crew reports of secondary explosions and spotty coverage by reconnaissance aircraft, which had to contend with cloud cover, enemy deception, and dense jungle foliage.[75] During the Arc Light campaign, B-52 missions were judged successful if they 1) released 50 percent of their weapons, and 2) placed 80 percent of released weapons within the target area.[76] By Linebacker II, the measure was reduced to simply the first Arc Light criteria of releasing 50 percent of the aircraft's load of weapons. Using this measure, Linebacker II was deemed highly effective with 703 of 708 missions meeting the criteria.[77] B-52 crewmembers still provided a measure of restraint, besides just trying to release their weapons. Crews were instructed to release their weapons only when "absolutely certain of [the] aiming point [since] the need for pinpoint accuracy was paramount."[78]

James R McCarthy, then a colonel and the 43d Strategic Wing commander on Guam, instituted a tactical evaluation program as a means to train his crews for combat. His system was very similar to the one used previously by the Arc Light crews. Crews first spent three days in a SCAT program learning "changes to air tactics, survival procedures, ordnance configurations, electronic countermeasures, and the latest intelligence information."[79] From there, specially designated pilots and radar navigators observed the new crew over the course of three sorties to provide any unique instruction while also evaluating the crew's potential. Crews could further demonstrate competency, be qualified to lead a cell (standard combat element of three B-52s), and eventually lead a wave (a collection of B-52 cells).

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[75] Trest, *USAF SAC Operations in Support of SE Asia*, 30-31.
[76] Chronology of SAC Participation in Linebacker II (Unclassified). Headquarters Strategic Air Command (Offutt AFB, NE: Office of the Historian, 12 August 1973), 311-312.
[77] Chronology of SAC Participation in Linebacker II (Unclassified), 311.
[78] Brig Gen James R. McCarthy and Lt Col George B. Allison, *Linebacker II: A View from the Rock* (Washington, DC: Office of Air Force History, 1985), 6.
[79] McCarthy and Allison, *Linebacker II*, 17.

Even further, "for those crews who demonstrated outstanding talents in both airmanship and teaching ability, there was the instructor crew designation" and the best among that group were "selected as tactical evaluation crews."[80] These tactical evaluation crews went on to review flying operations at large to train junior crews, propose changes to tactics, and evaluate tactics changes.[81] Brigadier General McCarthy claimed "this partnership would prove to be one of the key elements in the success of Linebacker II."[82] This well-trained cadre found they were extremely busy, as the number of crews and planes increased during Linebacker II, leaving few airmen remaining in the United States to sit alert duty. On Guam there were 99 B-52Gs paired with 149 crews; there were 53 B-52Ds paired with 52 crews; and at the Thai base of U-Tapao there were 54 B-52Ds paired with 85 crews for a grand total of 206 B-52s and 286 crews.[83] In 1972 there was a total of 402 B-52s assigned to SAC.[84]

**The Nuclear Mission**

SAC gradually decreased the number of aircraft performing the deterrence mission of sitting ground alert throughout the Vietnam conflict to dangerously low levels. In 1967, SAC continued to maintain 40 percent of bombers on alert with a small number flying "daily alert indoctrination missions" as SAC's primary mission remained "deterring a nuclear attack upon the United States." [85] By October of 1970, SACs alert force was so degraded that General Bruce K.Holloway, the SAC commander, could only double the number of aircraft on alert, from 72 to 144, in time to support President Nixon's ultimatum to North Vietnam

[80] McCarthy and Allison, *Linebacker II*, 20.
[81] McCarthy and Allison, *Linebacker II*, 20.
[82] McCarthy and Allison, *Linebacker II*, 20.
[83] Chronology of SAC Participation in Linebacker II (Unclassified), 29.
[84] Hopkins and Goldberg, *The Development of Strategic Air Command,* 176.
[85] Hopkins and Goldberg, *The Development of Strategic Air Command,* 147.

to achieve a "breakthrough [on negotiations] by November 1[or he] would resort to 'measures of great consequence and force.'"[86]

If one were to apply a measure of success to SAC's ability to meet its deterrence mission, having 72 bombers dedicated to alert duties when 528 were required, SAC would receive a failing grade.[87] The true numbers do not reflect such a large disparity between 1965 and 1973, although the low point occurred in 1972 when SAC was only able to fill 28.5 percent of the deterrence requirement.[88] The workload on those crews performing the nuclear mission must have been difficult to say the least, notwithstanding the risk mitigation provided by 42 FB-111s and nearly 1,100 ballistic missiles.[89]

A 1965 account of a SAC duty week gives a glimpse at the responsibilities placed on the alert crews before their numbers rapidly dissipated to support the Vietnam conflict. Lt Col Carroll H. Goyne Jr. was a SAC crewmember in 1965 and said the duty week comprised a sustained level of 72 hours at a time, when bomber manning was 1.6 crews per bomber and missile manning was 5.0 crews per missile.[90] The commitment was heavy, and, despite receiving extra alert pay, the colonel recommended an increase in manning and a reduction of ancillary training, which occupied 28 hours of the week for ground training and additional duties.[91] Nonetheless, President Nixon needed a large force to bomb Vietnam in order to convince its decision makers to return to the negotiating table. His policy regarding the use of airpower

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[86] Thompson, *To Hanoi and Back*, 166-167.
[87] 528 was the number of bombers assigned to the nuclear war plan covered earlier in the chapter.
[88] Lloyd, *A Cold War Legacy*, 680. Lloyd's non-cited numbers regarding bombers on alert compared to the alert requirement shows a gradual decline in meeting the nuclear commitment. Year: number required/number on alert: 1965: 340/314 (92 percent), 1966: 352/301 (85.5 percent), 1967: 248/223 (90 percent), 1968: 202/166 (82 percent), 1969: 190/100 (53 percent), 1970: 156/89 (57 percent), 1971: 56/112 (200 percent), 1972: 172/49 (28.5 percent).
[89] Hopkins and Goldberg, *The Development of Strategic Air Command,* 162.
[90] Lt Col Carroll H. Goyne, Jr., *The Strategic Air Command (SAC) Aircrew Duty Week: An Analysis* (Maxwell AFB, AL: Air War College, 1965), 13-14.
[91] Goyne, *The Strategic Air Command (SAC) Aircrew Duty Week*, 8, 15-16.

would have repercussions through the mid-1980s and factored into US preparation for Operation Desert Storm.[92]

**Summary**

SAC adjusted its training method to account for changes in national policy, which in turn drove changes in force structure. Over the course of the Vietnam conflict, SAC phased out 186 B-52s while devoting nearly half of the bomber force to the fight. SACs leaders met the conventional commitment by utilizing just-in-time training at deployed locations, by establishing a formal education process to train Southeast Asia designated aircrews, and by evolving a system to pass combat lessons learned from one crew to the next during the conflict. The B-52 crews were unprepared for a conventional fight, because their training before the conflict focused on meeting the demands of SAC's priority mission, nuclear deterrence. Yet, nuclear bombing skills were transferrable to conventional bombing, where priority is placed on identifying the target, or known aiming point, using the aircraft's radar, and then using the aircraft's release system to strike the target. In order to make the aircraft more combat effective, SAC's leaders had to modify aircraft to carry more weapons, and they had to ensure the planes had a precise way to identify the target which was fulfilled through SAC's COMBAT SKYSPOT units and a grid targeting system. The B-52 and its crews eventually performed well in Vietnam but also failed to fulfill their nuclear commitment to the levels envisioned in the nuclear war plans due to insufficient resources. The 93 BW at Castle AFB had to overcome a shortage of maintenance personal in order to produce B-52 crews for Southeast Asia as well as for SAC's alert bases throughout the country. President Nixon had little choice but to use airpower in Vietnam and that decision would later affect B-52s in 1991.

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[92] Randolph, *Powerful and Brutal Weapons*, 115-118. Nixon's Defense Secretary Laird warned him in April 1972 that the massive force buildup would have lasting long-term negative effects which was evident in the hollow force of the 1970s.

## Chapter 2

## From Vietnam to Operation Desert Storm

Seven B-52Gs departed Barksdale AFB, Louisiana on 16 January 1991 at 0635 local time on what would stand as a crowning achievement on the B-52's path to employing conventional weapons.[1] These aircraft carried 38 of the USAF's 44 Conventional Air Launched Cruise Missiles (CALCM) on the "longest combat mission ever flown" in order to strike communications facilities and electrical power plants in and around Baghdad.[2] The B-52 crews launched 34 CALCMs against targets in Iraq, destroying seven and damaging an eighth.[3] This mission culminated an evolutionary process of conventional weapon development, stretching from the end of bomber involvement in Vietnam to Operation Desert Storm (ODS). This process permitted a gradual shift in focus and training away from nuclear to conventional roles. What was this evolutionary process?

The immediate answer to why B-52s were used in ODS was simple, but does not identify the political roots of the change. At a meeting before 10 August 1990, some Checkmate planners working the Instant Thunder campaign planted the seed for using CALCM capable B-52s, because they were the only platform capable of launching "long range bombs," except for USN Tomahawk Land Attack Missiles.[4] Select crewmembers at Barksdale AFB were briefed on the special Secret Squirrel mission of using CALCM laden B-52s to initiate the attack on Iraq. Secret Squirrel crews were chosen from the 2d Bomb Wing's 596th Bomb Squadron, because that unit had trained specifically on the Air Launched Cruise Missile (ALCM), the nuclear predecessor to the CALCM

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[1] Richard G. Davis, *On Target: Organizing and Executing the Strategic Air Campaign Against Iraq* (Washington, DC: Air Force History and Museums Program, 2002), 166.
[2] Davis, *On Target*, 166, 196.
[3] Davis, *On Target*, 196.
[4] Davis, *On Target*, 72.

and the "two missiles and their launch procedures were very similar."[5] The crewmembers studied "week after week" while providing briefings to the wing commander to ensure continued readiness for the mission.[6] Yet, well before this period, in 1988, Gen John T. Chain Jr., the commander of Strategic Air Command (SAC), had designated four B-52G wings as conventional only, a decision which removed their commitment to the nuclear mission.[7] To understand why General Chain made that choice, one must examine changes after Vietnam to discover those factors that influenced him.

**The Evolution**

There is no single reason as to why the B-52 adopted an additional conventional role; many factors added to the situation, including changes in technology, policy, budgets, and war-fighting concepts. While some factors emerge as more important, all were necessary for the transition to occur. As Secretary of Defense Melvin R. Laird had warned President Nixon, the massive buildup for the final stages of conflict in Vietnam created "personnel turbulence … disrupted maintenance schedules and modernization programs [and led] to a decay in worldwide readiness."[8]

Immediately following the Vietnam conflict, SAC's bomber crews were placed on alert to resume the nuclear deterrence role, at a time when general purpose forces received more budget dollars than SAC's strategic forces.[9] The once proficient conventional force quickly lost its skill as the new SAC commander, General Russell E. Dougherty,

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[5] Maj Mark Van Doren, 608th Strategic Operations Squadron, 8th Air Force, Barksdale AFB, LA, to the author, e-mail, 21 April 2011. Major Van Doren was a 1st Lieutenant Standardization and Evaluation CALCM test crew Navigator on the lead B-52 for the opening night CALCM shot from Barksdale AFB.
[6] Jon Lake, *B-52 Stratofortress Units in Operation Desert Storm* (Oxford, UK: Osprey Publishing, 2004), 36.
[7] Robert F. Dorr and Lindsay Peacock, *Boeing's Cold War Warrior: B-52 Stratofortress* (London, UK: Osprey Publishing, 1995), 227.
[8] Stephen P. Randolph, *Powerful and Brutal Weapons: Nixon, Kissinger, and the Easter Offensive* (Cambridge, MA: Harvard University Press, 2007), 115, 117.
[9] Col Mike Worden, *Rise of the Fighter Generals: The Problem of Air Force Leadership*, 1945-1982 (Maxwell AFB, AL: Air University Press, 1998), 173.

understood in 1974 when he "tried to resurrect a conventional capability" after realizing it had "all but evaporated."[10] He was unsuccessful in his attempts, because budget cuts took their toll on SAC, forcing him to shed those missions that did not directly contribute to nuclear deterrence. A lack of funding for the Department of Defense forced President James E. "Jimmy" Carter Jr. to make a strategic choice over new weapon systems. The result cemented the B-52's role in stand-off attack using cruise missiles.

**The Air-Launched Cruise Missile and B-52 Training Adjustments**

SAC's aging but admirable B-52s performed well in Vietnam, but the aircraft was nearly a quarter of a century old, and SAC wanted a replacement aircraft. During the Vietnam conflict, General LeMay was unable to persuade McNamara to procure the XB-70 bomber, since the Defense Secretary found the B-52 to be more cost-effective.[11] This point was not lost on General David C. Jones, the new Air Force Chief of Staff, when attempting to build a coalition within the Air Force and Congress to support procurement of the new B-1 bomber. In 1976, a Brookings Institute study concluded "a standoff B-52 force with air-launched cruise missiles (ALCM) was far more cost effective than a fleet of B-1s."[12] Despite Jones' efforts to control and reduce costs, President Carter "decided to cut the B-1 in June 1977—against the advice of his Air Force chief … [in favor of] MX and cruise missiles," which he determined were more cost effective and posed a greater "deterrent value" against the Soviets.[13] The ALCM subsequently went through flight testing in 1979 and was fully distributed throughout the alert force by 1983 providing the president with a 1,500-mile nuclear standoff capability.[14] The

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[10] Worden, *Rise of the Fighter Generals*, 219.
[11] Robert F. Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1961-1984, Volume II* (Maxwell AFB, AL: Air University Press, 1989), 29-30.
[12] Worden, *Rise of the Fighter Generals*, 217-218.
[13] Worden, *Rise of the Fighter Generals*, 218.
[14] Alwyn T. Lloyd, *A Cold War Legacy: A Tribute to Strategic Air Command-1946-1992* (Missoula, MT: Pictorial Histories Publishing Company, Inc., 2000), 538, 540; Henry M.

budget crunch was only temporary, since a new president would be elected and implement the necessary changes to ensure America was postured to defeat the conventional and nuclear Soviet threat. But first, SAC had to incorporate the ALCM into the training regimen.

**Block Training.** SAC designed a new block-style syllabus in 1980 in order to introduce the new ALCM while accounting for B-52 resource training limitations. Before President Ronald W. Reagan entered the White House to reverse the decline in force readiness, SACs leaders had to confront the challenge of adding ALCM and new aircraft avionics software training to the Combat Crew Training Squadron (CCTS) syllabus. The CCTS staff at Castle AFB, California found themselves having to prioritize training events in the face of reduced flying hours, the need to "enhance fuel conservation," an already over-extended maintenance sortie generation capability, and an expected future increase in student production requirements.[15] The existing training syllabus relied on steady proficiency using "full mission profile training" but did not account for individual learning capabilities.[16] The new block-style, or progressive syllabus, was designed to focus on "fundamental skills" before introducing "advanced skills" allowing for a more tailored training profile in which those who demonstrated mastery at a quicker pace could advance faster through the syllabus. The result was a 5-to-15 percent reduction in the total number of sorties, which allowed more time for academic ground training devoted to instruction on the ALCM and new aircraft avionics.[17] This extra ground training time was also necessary given the findings of a team of USAF academics. The team

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Narducci, *Strategic Air Command and the Alert Program: A Brief History*, Office of the Historian, Headquarters SAC, 1 April 1988, 23.

[15] 93d Bombardment Wing (Heavy) History, Jan-Mar 1980, Call # K-WG-93-HI V.1, IRIS # 01038846, (Maxwell AFB, AL: USAF Collection, AFHRA, 1980), supporting documents--exhibit 96, page C-I-6.

[16] 93d Bombardment Wing (Heavy) History, Jan-Mar 1980, supporting documents--exhibit 96, page 1.

[17] 93d Bombardment Wing (Heavy) History, Jan-Mar 1980, supporting documents--exhibit 96, page 1.

was asked to evaluate the CCTS training program before instituting the new block-training syllabus.

**Overtraining**. Castle's wing commander, Brigadier General James P. McCarthy, invited a team of USAF academics to review his training program to determine if there was opportunity for improvement. The team conducted a comprehensive review and was impressed by the program, except that *SAC Regulation 60-4* caused "overtraining" due to the requirement of being highly qualified across a broad skill base.[18] It concluded that students were working beyond a productive learning period, which created negative value in the training program, and suggested shorter training periods during the day, while adding a few more academic days to the schedule.[19]

**Seeds, Weeds, and Flexibility**. Beyond the CCTS syllabus, SAC utilized two training tools to ensure B-52 crews were trained for their mission. SAC distributed a list of command-directed events (CDE) that directly measured unit readiness while providing wing commanders a category of wing-directed events (WDE) to focus on training deficiencies and to add new capabilities requiring specialized training.[20] These "seeds and weeds," as they were known, established a broad training priority for the B-52 force, which Air Combat Command would later modify into the Ready Aircrew Program (RAP). The RAP training prioritization exists to this day but has gone through significant transformation from SACs original program.

SAC CDEs were grouped into eight training categories: bombing, short-range attack missile (SRAM) activity, electronic warfare, gunnery, instrument training, navigation, proficiency, rendezvous and refueling,

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[18] 93d Bombardment Wing (Heavy) History, Jan-Mar 1980, 6-7. SAC Regulation 60-4 stipulated criteria for determining proficiency events, indicated by a "P" in the syllabus, while allowing individual wing commanders to determine criteria for familiarization events, indicated by an "F."
[19] 93d Bombardment Wing (Heavy) History, Jan-Mar 1980, 112-113.
[20] 93d Bombardment Wing (Heavy) History, Jan-Mar 1980, 124.

and tactics.[21] WDEs likewise conformed to this grouping. SAC expected every unit to complete all CDEs without fail. Routinely, units surpassed the minimum number of CDEs, evident in one example where SAC levied a requirement of 1,510 CDEs on Castle's 328th Bomb Squadron, and the crews actually accomplished 21,094 events.[22] Further, to tailor flying training to focus on global regions, SAC added contingency training events to the list of requirements for wings to fulfill, while acknowledging that CDEs and WDEs carried higher priority.[23]

By 1981, and before a new presidential defense budget took effect, Castle's leaders once again found themselves outmaneuvered by resource scarcity with CCTS manning at 62 percent, maintenance manning anywhere between 46 and 83 percent, and the addition of another CCTS student line requiring 20-25 additional monthly sorties.[24] To reduce the sortie generation burden on the maintenance team, the wing reduced the number of flying-hours by eliminating the SAC mandated student solo sortie and all contingency training activity.[25] Additionally, the wing significantly increased the utilization rate of synthetic training devices from a routine 50 to 80 percent to an all time high of 91.5 percent of scheduled hours.[26] These drastic measures were necessary, given that the wing had to pass a concurrent Operational Readiness Inspection and Nuclear Surety Inspection in November and December. Relief came to the wing just a short time later when the wing also acquired additional mission requirements.

**Rebuilding the Hollow Force**

The "hollow force" reached a culmination point by the time President Reagan entered office in 1980, and he took the necessary steps

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[21] 93d Bombardment Wing (Heavy) History, Jan-Mar 1980, 219.
[22] 93d Bombardment Wing (Heavy) History, Jan-Mar 1980, 219.
[23] 93d Bombardment Wing (Heavy) History, Jan-Mar 1980, 126-128.
[24] 93d Bombardment Wing (Heavy) History, Oct-Dec 1981, Call # K-WG-93-HI V.1, IRIS # 01047507, (Maxwell AFB, AL: USAF Collection, AFHRA, 1982), section 2 page 2, 6, 7.
[25] 93d Bombardment Wing (Heavy) History, Oct-Dec 1981, section 2 page 6.
[26] 93d Bombardment Wing (Heavy) History, Oct-Dec 1981, section 3 page 64.

to counter a formidable and threatening opponent. Neglect had left the military in an abysmal situation with training "at an all-time low … mission capable rates of our forces were extremely low, [and there were] serious gaps in our ability to retaliate after a Soviet nuclear strike."[27] President Reagan increased defense spending by nearly 50 percent, peaking in 1986, in order to modernize his military force, improve research and development, and pursue "high technology" such as stealth aircraft.[28] This level of spending was necessary given Soviet developments as reported by the Reagan administration in 1981: "the Soviets [had] never reversed, slowed, or even perturbed their robust strategic development and deployment programs in spite of détente, ongoing arms control negotiations, or the self-imposed restraints in our own strategic programs."[29] Moreover, the Soviet intervention in Afghanistan demonstrated their willingness to use force to pursue their interests, which also identified a weakness of the United States in that it lacked a responsive power-projection capability. SAC might have been able to cover the nuclear deterrence mission, but the Soviet intransigence in Afghanistan and the previously botched Iranian hostage rescue demonstrated the need for a responsive US force for actions other than nuclear war.

**Transition to Conventional Operations**

SAC found a new role with the creation of the Rapid Deployment Joint Task Force (RDJTF). The RDJTF formed in 1980 after the failed Iran hostage rescue mission to counteract a perception of US military ineptitude and would later become a new unified command called US

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[27]Richard H. Shultz, Jr. and Robert L. Pfaltzgraff, Jr., *The Future of Air Power in the Aftermath of the Gulf War* (Maxwell AFB, AL: Air University Press, 1992) , 266.
[28] Shultz and Pfaltzgraff, *The Future of Air Power*, 265-267.
[29] Statements by Secretary of Defense Casper Weinberger and Under Secretary Richard DeLauer as cited in Warren A. Trest, *Air Force Roles and Missions: A History* (Washington, DC: Air Force History and Museums Program, 1998), 228.

Central Command.[30] SAC's B-52 role in the RDJTF was codified in the Strategic Projection Force (SPF) with an assigned mission of low-level night attacks on airfields and lines of communication well "in advance of the tactical forces" in Southwest Asia.[31] Two North Dakota bases fulfilled the SPF, including the 5th and 319th Bomb Wings (BW) at Minot AFB and Grand Forks AFB. One of the squadrons that held this tasking devoted a portion of its training to the new SPF tasking, while still maintaining a nuclear commitment. RDJTF training consisted mostly of low-level formation flying and employing new weapons. The formation element was additionally complex due to the single-ship mentality embraced by SAC crews for the nuclear mission.

In 1979, the B-52 CCTS syllabus consisted of 13 to 15 sorties dedicated to nuclear employment.[32] After completing a nuclear profile check ride, CCTS students took another three-week academic course on conventional employment and flew another six sorties to develop proficiency in formation procedures including: aerial refueling, bombing, and station-keeping.[33] Students were assigned to follow-on units to complete their final Mission Qualification Training (MQT) specific to that unit's mission. During Dr. Stephen E. Wright's time at Minot AFB, he found many of the H-model crews needed to relearn some of the conventional tactics that came as second nature to him from his previous D- and H-model time at Carswell AFB.[34] Some of the complex problems the H-model force had to overcome included how to lead a three-ship of B-52s through a 180-degree turn on an aerial refueling track, and how

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[30] Trest, *Air Force Roles and Missions*, 228; Lloyd, *A Cold War Legacy*, 527; Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1961-1984, Volume II*, 660, 666.
[31] Futtrell, *Ideas, Concepts, Doctrine*, 667.
[32] Dr. Stephen E. Wright (School of Advanced Air and Space Studies), interview by the author, 29 March 2011. Dr. Wright was a B-52 crewmember that flew B-52Ds at Carswell AFB, Texas from 1979-1984 and transitioned to the B-52H before moving to Minot AFB, North Dakota in 1985. He later transitioned to the B-1 and command of two B-1 squadrons while the B-1 carried a commitment to the nuclear mission.
[33] Wright, interview by the author, 29 Mar 2011.
[34] Wright, interview by the author, 29 Mar 2011.

properly to separate formation elements passing over a low-altitude target, so the preceding aircraft's weapon detonation fragments did not interfere with trailing aircraft.[35] Sometimes mistakes were made, but in the end the crews were ready to conduct mining operations and gravity weapon releases in support of the SPF, while still providing nuclear deterrence through SRAM and gravity nuclear bomb release training. Dr. Wright attributed his comfort with these missions to the academic training he received while at the CCTS and to the proficiency he developed through daily training at Carswell AFB. At the other SPF-tasked base, Grand Forks AFB, the training focus remained primarily on nuclear employment despite the SPF tasking.[36] The conventional SPF training provided a bridge to additional conventional requirements. During the late 1970s and early 1980s, the US Army was developing a new doctrinal concept as a way to defeat the growing Soviet conventional threat in Europe.

**AirLand Battle and Strategic Bombers**

The US Army developed the new AirLand Battle concept to encompass deep offensive operations into Warsaw Pact countries by pairing tactical and strategic air power in combination with ground maneuver forces. This concept required a joint partnership between the USAF and USA, which steadily grew following Vietnam. In April 1983, all service chiefs committed to using "the 1982 edition of FM 100-5 as the basis for seeking increased integration of Army and Air Force tactical forces … [to integrate] AirLand Battle into theater operations."[37]

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[35] Wright, interview by the author, 29 Mar 2011.
[36] Raymond E. Turek, (2d Bomb Wing Treaty Compliance Officer), interview by the author, 11 April 2011. Mr. Turek was a B-52 Radar Navigator assigned to Grand Forks AFB, North Dakota from 1984 to 1987 and related the training focus at the time was 95 percent nuclear and 5 percent conventional.
[37] Harold R. Winton, "Partnership and Tension: The Army and Air Force between Vietnam and Desert Shield," *Parameters*, Volume XXVI, Spring (1996), 100-119, http://www.carlisle.army.mil/usawc/ parameters/Articles/96spring/winton.htm.

General Wilbur L. Creech, commander of Tactical Air Command (TAC), fully embraced his command's participation in this new joint concept and formed a strong relationship with the commander of the Army's Training and Doctrine Command (TRADOC), General Donn A. Starry. During this time period, the last of the bomber generals led SAC including General Richard H. Ellis and General Bennie L. Davis. SAC's reluctance to embrace AirLand Battle was evident when General Creech acknowledged a "shortfall in long-range offensive interdiction" other than USAF F-111s in 1981.[38] AirLand Battle was a TAC mission, and this new concept attracted defense spending for both the Army and Air Force.[39] The USAF gained the E-8 Joint Surveillance Target Attack Radar System and a potential follow-on aircraft for the A-10.[40] Perhaps the SAC generals were mollified when President Reagan revived the B-1 program, but the shift from bomber to fighter leadership across the USAF, combined with the emergence of a new war-fighting concept embraced by both the USA and TAC, must have been a challenge to SAC's dominance. It is not surprising to see SAC's very own General LeMay write an article in *Aviation Week and Space Technology* in 1984 expressing interest in pursuing a conventional bomber role: "We need a strategic conventional delivery capability if we are to have a credible deterrent and reduce the incentive for lower level conflicts."[41] LeMay's words were accurate and the USAF could have benefitted from his advice

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[38] Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1961-1984, Volume II*, 554.
[39] Thomas G. Mahnken, *Technology and the American Way of War Since 1945* (New York, NY: Columbia University Press, 2008), 128-129; Winton, "Partnership and Tension: The Army and Air Force between Vietnam and Desert Shield", 100-119.
[40] Mahnken, *Technology and the American Way of War Since 1945*, 129; Winton, "Partnership and Tension: The Army and Air Force between Vietnam and Desert Shield", 100-119.
[41] Gen Curtis E. LeMay, USAF, retired, "Non-Nuclear Bomber Forces," *Aviation Week and Space Technology*, 28 May 1984, 11, http://www.lexisnexis.com/hottopics/lnacademic/?sfi=AC00NBGenSrch&csi=6931&shr=t.

by 1986, when there was plenty of time to develop a precise power-projection capability.

**Conventional Standoff Missiles**

The successful strike on Libyan targets during Operation El Dorado Canyon in April 1986 revealed the lack of a responsive and precise, power-projection capability in the USAF. While the mission was an overall success, one F-111 was lost and "planning, co-ordinating, and executing" was difficult due to the number of actors involved, the range of operations, and a lack of accuracy.[42] To fill this gap, "the USAF chose to convert some of the existing 1739 AGM-86Bs [ALCMs] to the new conventional configuration."[43] This new conventional variant was developed between June 1986 and January 1988, and utilized a "terrain contour-matching guidance system with a GPS system" to place a "1,000-pound blast fragmentation warhead" on nearly any target within the missile's range.[44] With a new conventional ALCM the USAF was in a better position to support the AirLand Battle concept, since it had gained a capability to strike deeply at Warsaw Pact follow-on forces. The timing of this missile's development was critical given changes to the United States' strategic posture in 1987. The B-52 force finally had a perfect match between a stand-off attack weapon and an aircraft with virtually unlimited range, when supported by SAC's fleet of aerial refueling tankers.

The AirLand Battle concept lacked a deterrent role, if US conventional ground forces in Europe lost the support of accompanying theater nuclear missiles. In December 1987, the United States and Soviet Union signed the Intermediate-range Nuclear Force treaty which required the "rapid retirement and destruction of the [Ground Launched Cruise Missiles] GLCMs, along with the new Pershing II theater ballistic

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[42] Dorr and Peacock, *Boeing's Cold War Warrior*, 185.
[43] Lake, *B-52 Stratofortress Units in Operation Desert Storm*, 32.
[44] Mahnken, *Technology and the American Way of War Since 1945*, 172.

missiles."[45] Perhaps it is coincidental that SAC's leaders commissioned the RAND Corporation in 1987 to produce a study on the potential uses of conventionally armed bombers. The study concluded that B-52s are cost-effective, plentiful, and offer a rapid and precise response capability in addition to the penetration and weapons carriage advantages offered by the other SAC bombers.[46] By 1988, the CALCM was fully operational and could fill the capability gap in the AirLand Battle concept resulting from the loss of theater nuclear missiles. This capability was reassuring for SAC's B-52 proponents, because the aircraft possessed a lethal stand-off capability while avoiding the need to penetrate hostile airspace in the wake of the USAF's newest stealth aircraft at the end of 1988.[47]

**Establishing the Conventional Mission**

In a final move designed to cement a portion of the B-52 force in conventional operations, General Chain, SAC's commander, designated four B-52 wings, comprised of modified B-52Gs, as conventional-only units in 1988, thus removing their nuclear wartime commitment.[48] Of the four wings, only the 42 BW at Loring AFB, Maine, and the 62nd Bomb Squadron from Barksdale's 2 BW, would survive unit deactivations prior to Operation Desert Storm. To support this transition, General Chain enacted a new inspection regime, while allowing wings to tailor training in order to focus on conventional operations.

The new inspection regime was born on 24 August 1987 when "General Chain approved a revised concept for Conventional Operational Readiness Inspections (CORIs)."[49] Previously, the 320 BW at Mather AFB, California developed new tactics such as "low-level, close trail, and night multi-axis attacks using night vision goggles" to maximize damage

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[45] Shultz and Pfaltzgraff, *The Future of Air Power in the Aftermath of the Gulf War*, 280.
[46] Stephen T. Hosmer and Glenn A. Kent, *The Military and Political Potential of Conventionally Armed Heavy Bombers*, RAND Report R-3508-AF (Santa Monica, CA: RAND, August 1987), v-vii.
[47] Mahnken, *Technology and the American Way of War Since 1945*, 165
[48] Dorr and Peacock, *Boeing's Cold War Warrior*, 227.
[49] Lloyd, *A Cold War Legacy*, 601.

and minimize aircrew threat exposure for the new conventional mission.[50] These tactics served as "criteria for judging future [CORIs]" which stood in stark contrast to previous SAC inspection criteria, except for the use of the low-level environment.[51]

> To pass an Operational Readiness Inspection [in 1961] all alert bombers in a bomb wing had to pass a flight test that included meeting their scheduled launch times, flying a navigation leg in accordance with their established war-plan routes, completing at least one air refueling, arriving at the [Hypothetical] H-hour control line as briefed, actuating their bomb release system, and flying a precisely planned low-altitude maneuver designed for the delivery of the bulky MK-39 Mod 2 nuclear bomb or the lightweight parachute-retarded MK-28 RI nuclear bomb. If more than two out of eight bombers failed, the entire wing failed. In matters of the written tests, SAC simplified the process. If a member of a flight scored 100 percent, he passed. If he scored a 99 percent, he failed.[52]

CORIs evaluated units according to their roles in fulfilling Operation Plan missions which were translated into unit Designed Operational Capability (DOC) tasks. Before 1987, B-52s maintained conventional tasks, yet these tasks were not measured in an inspection. Even after General Chain implemented the CORI measurements, very few units were actually tested. The only 8 AF units that experienced a CORI were the 97 BW at Eaker AFB, Arkansas and the 42 BW at Loring AFB, Maine which carried a single conventional DOC task.[53]

The 2 BW was the only wing carrying both a primary conventional and primary nuclear tasking in 1988, as specified in the wing's DOC

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[50] Lloyd, *A Cold War Legacy*, 601.
[51] Lloyd, *A Cold War Legacy*, 601.
[52] L. Douglas Keeney, *15 Minutes: General Curtis Lemay and the Countdown to Nuclear Annihilation (*New York, NY: St. Martin's Press, 2011), 277.
[53] 8th Air Force History, Jan 1989 – Dec 1994. Call # K520.01 V.1, IRIS # 01120432, (Maxwell AFB, AL: USAF Collection, AFHRA, 1994), 262-263. The 97 BW was the first SAC unit to go through a CORI in 1988 in a "no-fault capacity." The 42 BW later passed its first CORI in 1988 after the inspection procedures were tested at the 97 BW. A second 42 BW CORI in 1989 had disastrous results so 8 AF suspended all further CORIs.

statement.[54] Other SAC wings carried additional conventional tasks but these were relegated to secondary missions. The DOC statement was an "important post-Vietnam innovation [for focusing on] specialized aircrew training" and was developed at a TAC fighter conference in 1972 addressing the "poor performance in air-to-air combat over North Vietnam."[55] One of the recommendations from the conference "was that aircrew training should be optimized by reducing the number of roles required in multimission combat aircraft," which they achieved by assigning each fighter squadron to "a primary and secondary DOC aimed at optimizing training for either the air-to-air or the surface-attack role."[56] This focus on primary and secondary missions enabled an accompanying three-level graduated training proficiency program: basic, mission-capable, and mission-ready.[57]

Prior to 1988, the 2 BW anticipated the addition of another DOC-task and began qualifying B-52 crews in both conventional and nuclear operations. Col Joseph F. Mudd, the 2 BW commander, decided to split the DOC-tasks among the wing's units such that the two squadrons each had its own unique mission—conventional or nuclear—since the DOC specified that crews could not be double-counted against other DOC missions.[58] SAC endorsed the 2 BW plan for dividing the missions between units, while Headquarters Air Force simply questioned the rationale for assigning two primary missions to one wing and did not approve the plan, yet allowed the 2 BW to continue using their established training process.[59]

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[54] 2d Bombardment Wing (Heavy) History, Jul – Dec 1988, Call # K-WG-2-HI V.1, IRIS # 01099779, (Maxwell AFB, AL: USAF Collection, AFHRA, 1992), xi.
[55] Benjamin S. Lambeth, *The Transformation of American Air Power* (Ithaca, NY: Cornell University Press, 2000), 65.
[56] Lambeth, *The Transformation of American Air Power*, 65.
[57] Lambeth, *The Transformation of American Air Power*, 65.
[58] 2d Bombardment Wing (Heavy) History, Jul-Dec 1988, 43-44, exhibit 74.
[59] 2d Bombardment Wing (Heavy) History, Jul-Dec 1988, 44, 55.

The 42 BW at Loring, the conventional-only wing, carried a single conventional DOC task and adopted a skill-based training system such that crews had to demonstrate proficiency in primary missions, and familiarity in secondary missions, during Mission Qualification Training (MQT) in accordance with wing commander derived standards.[60] Following MQT, B-52 crews advanced in proficiency, using a three-level graduated training profile where each level required six months to complete, meaning it took 18 months for an individual crew member to attain the highest level of proficiency following MQT.[61] This preparation was taking place at an appropriate time considering changes in the geopolitical situation that would only further prove the case for a conventional capability from SAC's bombers.

The once dominant threat of the bipolar Cold War era was diminishing. Former president of the Soviet Union Mikhail Gorbachev enacted two policies in his country, restructuring and transparency, which weakened the Communist grip on Warsaw Pact countries. The fall of the Berlin Wall in November 1989 served as a symbolic shift in global stability as former Warsaw Pact countries began to assert their rights of sovereignty to reverse communist domination, and as the threat to NATO that had persisted for "more than three decades" dissipated rapidly.[62] The possibility of a major nuclear exchange between the Soviet Union and the United States significantly decreased and was replaced by an increase in regional instability. The 1992 USAF Bomber Roadmap made it clear the preceding changes "all but removed the threat of global war" and enabled a shift in mission prioritization from nuclear to conventional

[60] 42d Bombardment Wing (Heavy) History, Jan-Dec 1990, Call # K-WG-42-HI V.1, IRIS # 01113316, (Maxwell AFB, AL: USAF Collection, AFHRA, 1991), 37-38.
[61] 42d Bombardment Wing (Heavy) History, Jan-Dec 1990, 38.
[62] Lambeth, *The Transformation of American Air Power*, 153.

which was only reinforced by bomber experiences in Kuwait and Iraq in 1991.[63]

## Iraq Invades Kuwait

On 2 August 1990, Saddam Hussein's Republican Guard forces swept across the Iraq-Kuwait border and "overran Kuwait, seized Kuwait City, and … moved rapidly toward the Saudi Arabian border."[64] Four days later, President George H. W. Bush sent F-15s from Langley AFB, Virginia to Saudi Arabia, and seven B-52Gs from the 42 BW at Loring AFB, Maine to the British owned island of Diego Garcia in the middle of the Indian Ocean.[65] By the end of August, 20 B-52Gs filled the ramp at Diego Garcia.[66] By 24 January 1991, there were 22 B-52s operating from Moron Air Base, Spain, and by 9 February, there were an additional eight B-52s deployed to RAF Fairford.[67] Additional B-52s were dispersed among these three bases and also deployed to Jeddah in Saudi Arabia, bringing the total number involved in the Gulf War to 74.[68] The large B-52 force exceeded the capacity of the conventionally tasked wings, so additional B-52 bases supplied aircraft and crews, resulting in a force with a very diverse set of experiences and training.

### Gulf War Bomber Training

The B-52 force on Diego Garcia was comprised of mostly Loring's conventional crews and an equal number of crews from Castle AFB. The Loring crews "hastily trained [the non-conventional crews] in conventional tactics, techniques and procedures," while accounting for the fact that the Loring crews had mostly prepared for a conventional

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[63] Department of the Air Force, *The Bomber Roadmap: Enhancing the Nation's Conventional Bomber Force* (June 1992), 1.
[64] Perry D. Jamieson, *Lucrative Targets: The U.S. Air Force in the Kuwaiti Theater of Operations* (Washington, DC: Air Force History and Museums Program, 2001), 1.
[65] Jamieson, *Lucrative Targets*, 4.
[66] Richard L Olson et al., *Gulf War Air Power Survey, Volume III, Part I: Logistics* (Washington, DC: Government Printing Office, 1993), 129.
[67] Olson et al., *Gulf War Air Power Survey, Volume III, Part I: Logistics*, 130.
[68] Lake, *B-52 Stratofortress Units in Operation Desert Storm,* 6.

war in the terrain of Central and Eastern Europe.[69] The provisional bomb wing on Diego established a two-sortie Initial Mission Qualification Training program, with one sortie being a local training profile consisting of formation procedures and simulated bombing, and a more robust second profile to the Arabian Peninsula.[70] This latter mission added "emission control procedures, secure and AWACS communications procedures, heavyweight air refueling, low-level training, timing control, bombing, multiple axis of attack, [and Electronic Countermeasure] ECM training."[71] The Gulf War Air Power Survey credits General Chain with encouraging his Director of Operations to increase Diego-based bomber training in November 1990, however, the bombers were already flying in many Arabian Peninsula exercises focused on package integration and night, low-level attacks.[72]

SAC bomber training leading up to Operation Desert Storm had focused on preparing B-52 crews for flying in the low-altitude regime. From September through October 1990, B-52s integrated with multiple strike packages to forge operating procedures, and B-52 crews had the opportunity to assess their future employment airspace and terrain. The Central Command Air Force Training Exercise schedule showed extensive involvement from the Diego-based bombers throughout this period, although specific tracking of bomber training tapered off into

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[69] Lake, *B-52 Stratofortress Units in Operation Desert Storm*, 45; Richard J. Blanchfield et al., *Gulf War Air Power Survey, Volume 1V, Part I: Weapons, Tactics, and Training, Appendix G: B-52 Training – The Diego Garcia Problem* (Washington, DC: Government Printing Office, 1993), 437.
[70] Blanchfield et al., *Gulf War Air Power Survey, Volume 1V, Part I: Weapons, Tactics, and Training, Appendix G: B-52 Training – The Diego Garcia Problem*, 438.
[71] Blanchfield et al., *Gulf War Air Power Survey, Volume 1V, Part I: Weapons, Tactics, and Training, Appendix G: B-52 Training – The Diego Garcia Problem*, 438.
[72] Blanchfield et al., *Gulf War Air Power Survey, Volume 1V, Part I: Weapons, Tactics, and Training, Appendix G: B-52 Training – The Diego Garcia Problem*, 439.

December and January.[73] On 15 January 1991, the training ended in order to prepare for the impending war.[74]

Another reason B-52s focused extensively on the low-altitude environment was due to an assessment of the most likely enemy threat—the Iraqi Air Force. As it turned out, the featureless terrain of open desert made the B-52 more susceptible to ground-based air-defense assets, since there were few natural features for the B-52 to use as camouflage from enemy radar systems. As one B-52 crewmember recalls these training sorties: "We barely had a discernable horizon and no real radar presentation due to the smoothness of the desert. However, we knew the layout of the terrain on ingress and were relatively comfortable until we transitioned to rougher terrain and approached the target area and artificial illumination."[75]

Nonetheless, the B-52 crews greatly appreciated the training received during this time period before the war, which was evident when they were polled by headquarters SAC: "'Did the SAC training program prepare you for combat?', eighty percent of the B-52 aircrew members responded yes."[76] But the small force of bombers with the 4300 Bomb Wing (Provisional) (BWP) on Diego Garcia was insufficient. More bombers arrived in theater at a later date, meaning that their routine unit training, and any last minute pre-deployment training, was essential in preparing them for the conflict.

**CONUS Bomber Training**

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[73] Maj Lewis D. Hill, Doris Cook, and Aron Pinker, *Gulf War Air Power Survey, Volume V, Part I: A Statistical Compendium* (Washington, DC: Government Printing Office, 1993), 173-187.

[74] Blanchfield et al., *Gulf War Air Power Survey, Volume 1V, Part I: Weapons, Tactics, and Training, Appendix G: B-52 Training – The Diego Garcia Problem*, 439.

[75] Mr. Ronald L. Funk, 49th Test Squadron, Barksdale AFB, LA, to the author, e-mail, 28 March 2011. Mr. Ron "Rofu" Funk was a B-52 crewmember stationed at three B-52 conventional wings, Mather AFB, California, Andersen AFB, Guam and Loring AFB, Maine, before the Persian Gulf War and flew combat missions from both Diego Garcia and Jeddah AB from August 1990 through March 1991.

[76] Blanchfield et al., *Gulf War Air Power Survey, Volume 1V, Part I: Weapons, Tactics, and Training, Appendix G: B-52 Training – The Diego Garcia Problem*, 439.

Just as the B-52 mission evolved from nuclear to conventional, so did its training regimen. SAC's B-52s had participated in Red Flag exercises at the Nellis, AFB ranges in Nevada since 1975 and the crews gained valuable exposure to large force integration, such that by 1978 all of SACs B-52s and F-111s were participating in the TAC Red Flag exercises.[77] Red Flag not only brought a SAC-centric crew force into integration scenarios with other platforms, but also eventually educated them on future command, control, and planning processes. Initially the bombers did not fully integrate into the Red Flag exercises which would include landing and debriefing after a sortie since the crews typically departed from their home base and flew black-line routing through the Nellis ranges.[78]

Typically, a specific "Bomb-Nav" office comprised of specially designated B-52 aircrew members turned commander's guidance into a mission profile designed to achieve specific objectives.[79] The rest of the crew force lacked exposure to this planning capability, unless they participated in Red Flag. The Red Flag exercise sorties exposed the B-52 crew members to "Airspace Control Orders, Air Tasking Orders, Special Instructions, Rules of Engagement, and communication and deconfliction plans."[80] Usually, it was the unit's specially trained USAF Weapon School graduates that understood how the planning process came to fruition to produce a B-52 mission. As the SAC bombers gained

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[77] J.C. Hopkins and Sheldon A. Goldberg, *The Development of Strategic Air Command*, 1946-1986 (Offutt AFB, NE: Office of the Historian, Headquarters Strategic Air Command, 1986), 208, 216.

[78] Col Robert A. Colella, National Defense University, Fort McNair, Washington, DC, to the author, e-mail, 13 May 2011. Colonel Colella was a B-52 pilot assigned to Wurtsmith AFB, Michigan from 1988 to 1992 and flew Red Flag sorties where bombers did not participate in mission pre-brief and debrief and thus did not fully integrate with other aircraft. Col Colella notes that even up through 1994, some B-52 wings had not fully integrated into the Red Flag exercise by staging operations out of Nellis AFB, Nevada.

[79] Funk, to the author, e-mail, 28 March 2011.

[80] Funk, to the author, e-mail, 28 March 2011.

additional conventional tasks with the SPF and RDJTF, the need for more conventional training became apparent.

SAC developed a robust conventional training concept that consisted of bomber deployments to bare-base locations in order to practice expeditionary operations, and increased the number of live weapon releases. A B-52 crewmember from Eaker AFB in Blytheville, Arkansas detailed his involvement in SAC's conventional training exercises.

> Somebody at HQ SAC knew conventional war was coming. In the 1984-1987 timeframe, we typically flew long, 12-hour training sorties that featured air refueling, low-level, and nuclear weapons employment and tactics. I think my Grand Forks AFB, ND, (319 BMW, 46 BMS) crew dropped only a couple of actual shapes per year. Hardly ever saw actual conventional weapons. Getting closer to 1989-1990, we started the Mighty Warrior series of multiple bare-base deployments. My Unit (Blytheville AFB, AR, 97 BMW, 340 BMS) deployed to Sidi Slimane AB, Morocco; Clinton Sherman AFB, OK; Biggs Army Airfield, TX; and Whiteman AFB, MO, setting up tent cities to prepare for extended flying operations from austere locations.[81]

In order to improve bomber lethality and responsiveness, SAC's Director of Operations tasked the 320th Bomb Wing at Mather AFB, California, in June 1989, to "develop and evaluate a methodology for short notice targeting of conventionally tasked SAC bomber aircraft."[82] The wing validated "airborne replanning [as] a viable option [so long as the command accepts] unit-level innovation and *experimentation* in a no-

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[81] Raymond E. Turek, 2d Bomb Wing Treaty Compliance Officer, Barksdale AFB, LA, to the author, e-mail, 25 March 2011; Colella, to the author, e-mail, 13 May 2011. Col Colella also had a similar experience of deploying to austere locations like Biggs Army Airfield to conduct training and even participated in Red Flag exercises from these austere locations.

[82] Col David F. Johnson, commander 320th Bombardment Wing, SAC Rapid Response Bombing Test After Action Report, 30 June 1989, Call # K416.312-177 Jan 1989 – Mar 1991, IRIS # 00883447, in the USAF Collection AFHRA, Maxwell AFB AL. (Secret) Information extracted is unclassified.

harm, no-foul environment" (emphasis added).[83] The Rapid Response Bombing concept validated that in-flight target changes were one of "the most difficult tasking/execution [problems] for an airborne crew" so they were allocated a planning factor of 30 minutes for each new target assignment.[84] After reviewing the after action report, the SAC Director of Bomber Operations commented that he "found no degradation in bombing accuracy at 35,000 [feet air-to-ground-level]."[85] But there were more training opportunities made available as war in the Persian Gulf drew nearer.

Starting in October 1990, SAC conducted Desert Warrior training on the Nellis ranges to "simulate the situations they would likely encounter in combat [and to give] the crews exposure to the [US Air Forces, US Central Command] CENTAF ATO procedures and tactics."[86] However, this training was not rated as effective as "in-theater" training.[87] Mr. Turek relayed that his B-52 weapon training prior to the Gulf War came in two formats. Routine training consisted of low-level conventional training releasing inert weapons on established ranges, and a second, new format, approved by SAC, called Bomb Your Own Base (BYOB).[88]

The BYOB training profile was approved in 1989 by Secretary of the Air Force Donald B. Rice as a means to enhance bomber training during SAC's "back to basics" training evolution.[89] The training was

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[83] Johnson, SAC Rapid Response Bombing Test After Action Report, 30 June 1989. (Secret) Information extracted is unclassified.
[84] Johnson, SAC Rapid Response Bombing Test After Action Report, 30 June 1989. (Secret) Information extracted is unclassified.
[85] Johnson, SAC Rapid Response Bombing Test After Action Report, 30 June 1989. (Secret) Information extracted is unclassified.
[86] Blanchfield et al., *Gulf War Air Power Survey, Volume 1V, Part I: Weapons, Tactics, and Training, Appendix G: B-52 Training – The Diego Garcia Problem*, 439-440.
[87] Blanchfield et al., *Gulf War Air Power Survey, Volume 1V, Part I: Weapons, Tactics, and Training, Appendix G: B-52 Training – The Diego Garcia Problem*, 440.
[88] Turek, to the author, e-mail, 25 March 2011.
[89] Strategic Air Command History, Jan – Dec 1989, Call # K416.01-219, Vol. 1, p 247, 252, IRIS # 01099700, in the USAF Collection AFHRA, Maxwell AFB, AL. (Secret) Information extracted is unclassified.

adopted because a lack of training ranges prevented the SAC bombers from "meeting General Chain's goal of releasing live or inert weapons on 50 percent of all low-level training flights."[90] One other noteworthy outcome of SAC's training program was a recommendation "that bomber training be tailored to specific unit missions [to provide] greater responsibility by specific units."[91]

SAC's leaders thought B-52s were able to employ unguided weapons accurately from high altitude as a result of the experimentation done by the Mather AFB crews in 1989, and they hoped to improve proficiency by increasing weapon releases on training sorties. However, the BYOB profile stressed low-altitude employment. The crews typically departed their base on a training sortie, and then quickly entered a low-level bombing pattern that would align them with their home field runway. The aircraft would offset and drop inert weapons on the in-field, which were immediately scored by a fellow B-52 crewmember observing from the ground.[92] The crews would then fly a local low-level route before returning to land. Mr. Turek's high-altitude bombing was put to the test during the Desert Warrior training on the Nellis ranges in the fall of 1990:

> Our high-altitude conventional bombing results were the best of any Gulf War unit. This is directly attributable to what we learned dropping Mk-82s from high altitude at the Nellis Ranges. From around 30,000 feet, we were consistently about 400 feet short of the target. So, we applied a 400 foot correction and saw excellent results. We let HQ SAC know that was what we were doing. In expectation of impending combat, I devised a timing correction table to remove this error. By using the data compiled from high-altitude practice, testing, and reports from the other units showing bombs hitting 600 feet short of the target, I developed a timing correction table that

[90] Strategic Air Command History, Jan – Dec 1989, 253. (Secret) Information extracted is unclassified.
[91] Strategic Air Command History, Jan – Dec 1989, 255. (Secret) Information extracted is unclassified.
[92] Turek, to the author, e-mail, 25 March 2011.

> incorporated Altitude and Ground Speed to provide a Desired Train Length that was shifted an appropriate length down track. I also created an automated, spreadsheet-based bomb form that could compute all the data from the most basic inputs--Initial Point and target coordinates (one for each type weapon)—to compute heading, distance, release point, timing, and system data. This spreadsheet was efficient and added many cross-checks to prevent computation or transcription errors. Much of the basics for the bomb form came from weapon primers originating in other SAC units like Guam's, 1 CEVG, Castle, Barksdale, and Loring; SAC Regulation 3-1 Vol 3, B-52G and H Technical Orders, and the weapon Technical Order 1-1M-34.[93]

It is surprising then to see others claim that the B-52 crew force did not learn to correct these high-altitude accuracy errors until moving from low- to high-level bombing during the Persian Gulf War.[94] Given stories from other B-52 crewmembers that recounted that their first time dropping conventional weapons was in combat, it is very likely the lessons learned from Desert Warrior, and the Rapid Response Bombing report, were not distributed to the crew force before the war.[95]

**Assessing the Results**

Just like in Vietnam, assessing definitive results of B-52 bombing activity during Operation Desert Storm was difficult due to a lack of responsive bomb damage assessment.[96] There were simply too few intelligence collection assets to assess every target when some targets were struck by multiple platforms, preventing any eventual assessment

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[93] Turek, to the author, e-mail, 25 March 2011.
[94] See Jamieson, *Lucrative Targets*, 88-89. General Caruana, CENTAF director of strategic forces and 17 Air Division commander attributed high-altitude precision errors to "wind effects" and other 17 AD reports attributed the lack of precision to the lack of a need for precision.
[95] Peter E. Davies and Tony Thornborough, *Boeing B-52 Stratofortress* (Ramsbury, UK: The Crowood Press Ltd., 1998), 127; Jamieson, *Lucrative Targets*, 88; Lake, *B-52 Stratofortress Units in Operation Desert Storm*, 48.
[96] Kwai-Chung Chan et al., *Operation Desert Storm: Evaluation of the Air Campaign*, Report to the Ranking Minority Member, Committee on Commerce, House of Representatives (Washington, DC: United States General Accounting Office, June 1997), 18, 19, 27, 232.

from distinguishing between the various types of aircraft employed.[97] "B-52s conducted four distinct missions during the Gulf War: attacking strategic fixed targets, Scud hunting, attacking Iraqi Army and Republican Guard targets, and supporting breaching operations."[98] There were varying degrees of success by target type, which some post-Gulf War studies were able to analyze.

The B-52 was an excellent match for the four main Iraqi target sets, because a crew could use the onboard radar to target industrial facilities and other strategic targets, while also inflicting a devastating psychological impact on troops due to a massive payload. Mr. Turek was a strike planner during Operation Desert Storm for the 806th BWP based at RAF Fairford, United Kingdom, and offers unique insight on why the 806 BWP was so successful in the conflict. A majority of the crews came from the 97 BW at Eaker AFB, Arkansas and had conducted a significant amount of high-level bombing training on the Nellis Ranges during the Operation Desert Shield timeframe. Comparison among four bomb wings participating in the Nellis-range training revealed a significantly more accurate Circular Error Probable (CEP) for the Eaker AFB crews.[99] They passed a nuclear inspection in November 1990, before being surprised with a rapid deployment to support the Gulf War.[100] Once in place, the wing was primarily targeted against "factories, key buildings, hangars, transmission yards, power generation plants, berms, artillery units, and choke points."[101] All of their bombing was done from high-altitude and they achieved a marked advantage in precision over the other Gulf War

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[97] United States General Accounting Office, *Operation Desert Storm: Limits on the Role and Performance of B-52 Bombers in Conventional Conflicts*, Report to Congressional Requesters (Washington, DC: United States General Accounting Office, May 1993), 4, 8.
[98] Blanchfield et al., *Gulf War Air Power Survey, Volume 1V, Part I: Weapons, Tactics, and Training,* 231.
[99] 806 Bombardment Wing (P), Desert Storm Concept of Operations Lessons Learned Briefing Slides, n.d., slide 16. The 97 BW had a CEP of 331 feet, the 2 BW had a CEP of 438 feet, the 379 BW had a CEP of 501 feet, and the 416 BW had a CEP of 564 feet. This data reflected the 400 foot error in bombing short of the target.
[100] Turek, to the author, e-mail, 1 April 2011.
[101] Turek, to the author, e-mail, 25 March 2011.

B-52 wings for two reasons.[102] First, they had trained to the high-altitude mission and developed procedures to account for aircraft and system ballistic errors. Second, they also had Analytical Photogrammetric Positioning System (APPS) personnel collocated with them at RAF Fairford that could mensurate coordinates for the CENTAF assigned targets. The CENTAF target coordinates were usually incorrect, so the APPS operators were essential for improving accuracy.[103] To successfully strike the targets, the B-52 Radar Navigator used the aircraft's radar to aim on radar-significant targets, or a radar-significant offset aim point, which an APPS operator had mensurated to provide exact coordinate locations. Given this targeting capability, it was relatively easy for the bombers to transition to striking large troop formations with devastating effect.

The General Accounting Office (GAO) report evaluating the air campaign listed several metrics regarding B-52 effectiveness. The report considered strategic targets appropriate for unguided munitions, since they generally covered a large area like industrial buildings, airfields, and petroleum, oil, and lubricants facilities.[104] Of the 50 strategic targets assigned to B-52s, for which there was an assessment capability, the GAO report determined B-52s were "fully successful" in striking 25 targets, and "not fully successful" in striking 35 targets for a 41.6 percent success rate.[105] However, this strategic platform flew a majority of its sorties against the strategic target set of Republican Guard units, for which assessment was difficult to obtain. Therefore, the GAO report

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[102] Jamieson, *Lucrative Targets*, 92.
[103] Jamieson, *Lucrative Targets*, 89; Chan et al., *Operation Desert Storm: Evaluation of the Air Campaign*, 209.
[104] Chan et al., *Operation Desert Storm: Evaluation of the Air Campaign*, 45, 70. Strategic targets were divided into 12 major groups: command, control and communications facilities; electrical facilities; ground order of battle; government centers; lines of communication; military industrial base facilities; naval facilities; nuclear, biological, and chemical facilities; offensive counterair installations; oil refining, storage, and distribution facilities; surface-to-air missile installations; and Scud missile facilities.
[105] Chan et al., *Operation Desert Storm: Evaluation of the Air Campaign*, 113.

correlated B-52 strikes with prisoner defection and reporting to conclude that "the B-52 and A-10 were cited by Iraqi prisoners of war as the most feared of the coalition aircraft."[106]

B-52s flew two-thirds of their Gulf War sorties against Iraqi ground forces, while supporting this effort with psychological operations which prompted further defections. [107] B-52s conducted psychological operations by dropping leaflets on frontline troops on one day warning they would return to bomb the same location the following day. The next day, true to their word, the B-52s returned and replaced the leaflets with hot iron. The third day, B-52s again delivered leaflets saying they would return to bomb again. This was usually sufficient to encourage the Iraqi ground forces to desert *en masse*.[108] "Within the first twenty-four hours of the conflict, three B-52s would attack the mechanized Tawakalna Division, conducting the first of a relentless series of sorties against Hussein's elite units. These bombers were scheduled to hit the Republican Guard in the [Kuwaiti Theater of Operations] KTO every hour, twenty-four hours a day, until the end of the war … 40 percent of all their missions—went against these elite units."[109]

One of the methods utilized by B-52s for attacking Republican Guard forces was adopting "the 'kill box' method of dividing the battlefield" into larger boxes and smaller quadrants such that a cell of B-52s could drop "their ordnance causing a strip of destruction 1.5 x 1 mile."[110]

During the Battle of Khafji in southern Kuwait on 31 Jan 1991, "the effect of the B-52 strike was 'like turning on a light in a cockroach

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[106] Chan et al., *Operation Desert Storm: Evaluation of the Air Campaign*, 32; Hill, Cook, and Pinker, *Gulf War Air Power Survey, Volume V, Part I: A Statistical Compendium*, 69.
[107] Chan et al., *Operation Desert Storm: Evaluation of the Air Campaign*, 208.
[108] Hill, Cook, and Pinker, *Gulf War Air Power Survey, Volume V, Part I: A Statistical Compendium*, 339-341.
[109] Comments by Major General Glosson and Lieutenant Colonel Deptula as cited in Jamieson, *Lucrative Targets*, 45, 65.
[110] Davies and Thornborough, *Boeing B-52 Stratofortress*, 129.

infested apartment.'"[111] "The B-52 strikes sent the vehicles scurrying for survival only to find that their movement was awaited by tactical air, eager to 'squish them like bugs.'"[112] Additionally, Brigadier General Patrick P. Caruana, CENTAF's Director of Strategic Forces, found B-52s provided "effective breaching capability" where their task was to clear minefields, barriers, and other obstacles ahead of ground forces.[113]

There were also several learning opportunities for the bomber crews that reflected on their level of prewar training. Both the SAC and CENTAF planners thought the B-52 was best utilized in the low-level attack role given the expected threat from the Iraqi air force. Due to the swift achievement of air superiority in the region, the high altitude environment quickly became a sanctuary for coalition strike aircraft. The real threat came from thick concentrations of low- to medium-caliber antiaircraft artillery (AAA) surrounding desirable targets. At low altitudes, coalition aircraft were not safe from the AAA and infrared surface-to-air missiles, so Brigadier General Buster C. Glosson, the CENTAF Director of Campaign Plans, "ordered that all coalition aircraft observe a minimum attack level of about 12,000 feet."[114] The second learning point was that 8th Air Force and SAC officers assessed "'a minimum of two missions were required before the crews were able to adjust to the combat environment."[115] Unfortunately, despite these successes and learning opportunities, one man found the experience disturbing.

The very person "responsible for the grand strategy option proposals" for the Gulf War would also be the one to mark the B-52 with

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[111] Marine Force Central Situation Report comments as cited in Hill, Cook, and Pinker, *Gulf War Air Power Survey, Volume V, Part I: A Statistical Compendium*, 218.
[112] US Commander in Chief, Central Command Situation Report comments as cited in Hill, Cook, and Pinker, *Gulf War Air Power Survey, Volume V, Part I: A Statistical Compendium*, 218.
[113] Jamieson, *Lucrative Targets*, 129.
[114] Chan et al., *Operation Desert Storm: Evaluation of the Air Campaign*, 98-99.
[115] Jamieson, *Lucrative Targets*, 89.

his own assessment of "low … performance" highlighting the inefficiencies of SAC's preparation for the war.[116] General G. Lee Butler was SAC's thirteenth and last commander and determined the B-52 "would not be invited" to future wars, if it maintained the nuclear mission as its sole purpose.[117] General Butler, along with General Colin Powell, rightly determined that the international order was changing with the end of the Cold War, and the B-52 needed to keep pace with this change. It is interesting to note that in disestablishing SAC and in standing up the new US Strategic Command, General Butler wanted to "avoid reinventing the wheel by going back to the source of brilliantly inspired men who were slightly ahead of their time" referring to General LeMay's concept for a new Strategic Command, which General Butler merely updated 33 years later.[118] Part of disestablishing SAC entailed a change to the nuclear mission.

**The Nuclear Mission**

The nuclear alert requirement for bombers remained relatively static following the Vietnam conflict through 1981 at which point it steadily decreased to zero by 1991.[119] Assessments by US leadership enabled this reduction in the need for alert forces. In 1975, the Secretary of Defense determined the United States had more time to react to the Soviet threat, since they would see a "deterioration of relations with the Soviet Union" and could thus accept only 30 percent of bombers on alert.[120] SAC continued to conduct periodic individual unit and wing Operational Readiness Inspections (ORI), to ensure a state of nuclear readiness, but had never exercised the entire nuclear force until 1979. From 8 to 16 July 1979, SAC conducted the first command-wide

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[116] Gen George L. Butler, "Disestablishing SAC," *Air Power History: The Journal of the Air and Space History* 40, no. 3 (Fall 1993): 8.
[117] Butler, "Disestablishing SAC," 8.
[118] Butler, "Disestablishing SAC," 11.
[119] Lloyd, *A Cold War Legacy*, 680.
[120] Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1961-1984, Volume II,* 387.

nuclear exercise, dubbed Global Shield, in which every airplane, missile, base, and command organization participated.[121] From that point forward, SAC conducted an annual exercise for the entire nuclear force until 1987.[122] Throughout this time, B-52 wings also acquired conventional tasks, such that, by 1988, "all B-52 bomber squadrons [were] 'dual-tasked' with both nuclear and conventional missions."[123] For some bomber crews, all they knew was that they had a "blue-dot" form to fill out that listed all training requirements, without distinguishing mission priority.[124] It is illustrative to review training prioritization for those dual-tasked units.

During Dr. Wright's time at Carswell AFB flying D-models, 1978-1984, the 20th Bomb Squadron crews split their time evenly between the nuclear and conventional missions. [125] The 7 BW at Carswell had failed a nuclear inspection in 1979 so nuclear training was his unit's priority to pass a re-inspection.[126] When he transitioned to Minot AFB from 1985-1986, flying H-models, the unit was primarily focused on the nuclear mission, except for a single flight within the squadron that was assigned the SPF tasking under the RDJTF.[127]

Mr. Turek, who was also assigned to an SPF tasked unit at Grand Forks AFB, related that 95 percent of training was focused on the nuclear mission.[128] When he moved to Blytheville AFB, Arkansas, later renamed Eaker AFB, he saw a gradual decline in the dual-DOC unit's nuclear training from 70 percent in 1988, to 60 percent in 1989, 30

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[121] Hopkins and Goldberg, *The Development of Strategic Air Command*, 225.
[122] Lloyd, *A Cold War Legacy*, 600.
[123] Gen John T. Chain Jr., "Strategic Bombers in Conventional Warfare," *Strategic Review* 16, no. 2 (Spring 1988): 23-32.
[124] Wright, interview by the author, 30 April 2011; Funk, to the author, e-mail, 27 April 2011.
[125] Wright, interview by the author, 30 April 2011.
[126] Wright, to the author, e-mail, 1 May 2011.
[127] Wright, interview by the author, 30 April 2011.
[128] Turek, interview by the author, 11 April 2011.

percent in 1990, and finally to 10 percent in 1991.[129] It is worth pointing out that his wing went through a Nuclear ORI during Operation Desert Shield scoring an excellent 0.996 Damage Estimate rating on low-level "first-look" targets, which the crews had never seen before.[130] During this time, the crews were told they would not deploy for the Persian Gulf War, but still devoted time to the BYOB program as well as SAC's Desert Warrior training.

Mr. Funk related that before Mather AFB in California converted to the conventional-only mission, they devoted 75 percent of training to the nuclear mission from 1986 to 1988.[131] Maj Van Doren was assigned to the nuclear 596th Bomb Squadron at Barksdale AFB, Louisiana, where 85 percent of training was dedicated to the nuclear mission.[132] All of these nuclear crews spent every third week on nuclear alert. While on alert, the crews spent 50 to 80 percent of their time during crew changeover studying Emergency Action Message (EAM) processing—now called Emergency Action Procedures, Emergency War Order guidance, route study, and aircraft systems.[133] All of this study was conducted in addition to standard monthly nuclear training.[134] The crews at Mather AFB also had a weekly "no-notice" ORI certification to ensure they were ready for their mission.[135] For those crews with the luxury of a collocated synthetic training device—simulator or Weapon System Trainer—the alert crews also flew a rehearsal mission for their generated sortie.[136] These simulators were especially useful for practicing the nuclear mission in the absence of actually flying the sortie.[137]

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[129] Turek, to the author, e-mail, 1 April 2011.
[130] Turek, to the author, e-mail, 1 April 2011.
[131] Funk, to the author, e-mail, 28 March 2011.
[132] Van Doren, to the author, e-mail, 21 April 2011.
[133] Van Doren, to the author, e-mail, 21 April 2011; Turek, to the author, e-mail, 1 April 2011; Funk, to the author, e-mail, 28 March 2011.
[134] Turek, interview by the author, 11 April 2011.
[135] Funk, to the author, e-mail, 28 March 2011.
[136] Turek, to the author, e-mail, 1 April 2011; Mr. Paul A. Griffith, 2d Operations Support Squadron, Barksdale AFB, LA, to the author, e-mail, 31 Mar 2011. Paul

SAC's standard for measuring unit readiness was an ORI. Because the weapon delivery methods remained relatively unchanged since the 1960s, ORIs were rather reliable in assessing unit readiness. The most important measure was a B-52 crew's ability to strike the target. "Bomb scoring was 'a'—if not 'the'—major factor in ORIs."[138] Other graded areas included timing, electronic countermeasures, missile activity, and EAM processing.[139] As different nuclear weapons were phased out and replaced by new standoff cruise missiles, ORI criteria slowly changed. Five nuclear gravity bombs were phased out by 1991 and the SRAM was retired in 1990 leaving only the B61, B83, ALCM, and later the Advanced Cruise Missile as the B-52's mainstay of nuclear weapons.[140] In employing these weapons, the crews only had to focus on two skill-sets, gravity freefall releases, which were exactly like releasing a conventional freefall weapon, and cruise missile launch procedures.

There were annual changes to the nuclear Single Integrated Operational Plan (SIOP), as planners adjusted targets based on assessments from SACs Joint Strategic Target Planning Staff (JSTPS). The JSTPS performed the centralized role for "integrated target planning" and published significant target changes annually in new SIOP revisions.[141] Throughout the year, minor routing changes were distributed to the crew force.[142] However, what did not change was EAM

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Griffith performed B-52 nuclear alert duties under SAC and again during nuclear exercises under ACC.

[137] Turek, to the author, e-mail, 1 April 2011; Griffith, to the author, e-mail, 31 Mar 2011.

[138] Funk, to the author, e-mail, 31 March 2011.

[139] Funk, to the author, e-mail, 31 March 2011; Griffith, to the author, e-mail, 31 Mar 2011.

[140] Davies and Thornborough, *Boeing B-52 Stratofortress*, 111; Lloyd, *A Cold War Legacy*, 607. The Advanced Cruise Missile was recently retired and played a role in the 2007 unauthorized nuclear transfer incident. The B28 was phased out in 1980, the B28FI in 1984, the B41 in 1976, and the B53 in 1987.

[141] Lt Col Rita Clark, Vincent A. Giroux, Jr., and Todd White, *History of the United States Strategic Command*, Command Historian Office, 1 June 1992—1 October 2002, 13. http://www.stratcom.mil/files/History.pdf; Funk, to the author, e-mail, 31 March 2011; Wright, interview by the author, 29 Mar 2011.

[142] Wright, interview by the author, 29 Mar 2011.

processing procedures—then called Command and Control Procedures (CCP). CCP was "black and white" such that "running the checklist was a given … if there were wide-spread problems processing messages, then this was an indication of an error with the checklist."[143] If, during an ORI, the crews encountered an EAM problem that the checklist did not address, "wing-level leaders would toss out these questions from the ORI and make SAC implement the correction."[144] The changes then filtered back down to the highly qualified CCP instructors, who would later become squadron commanders and O-6 colonels.[145] Since CCP was usually straightforward, the challenge for the crews came in delivering weapons and successfully pacing themselves throughout the inspection.

Since bomb scores were the major indicator of nuclear readiness, nearly every SAC wing tracked bomb scores by holding quarterly Bombing Reliability Committee meetings, chaired by the wing commander. Any wing history under the SAC regime will show that commanders took this measure seriously and expected high reliability numbers.[146] As a form of motivation, each B-52 Radar Navigator's running bomb score tally was displayed by his name when reliability was briefed to the operations group and wing commanders at weekly meetings.[147] For the best radar navigator that achieved the best bomb score during the annual SAC bomb competition, the SAC commander endorsed that officer's annual performance report, acting as an

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[143] Wright, interview by the author, 29 Mar 2011; Griffith, to the author, e-mail, 31 Mar 2011; Funk, to the author, e-mail, 31 March 2011.
[144] Wright, interview by the author, 29 Mar 2011.
[145] Wright, interview by the author, 29 Mar 2011. Dr. Wright noticed this trend during his B-52 time from 1979 to 1985. Colella, to the author, e-mail, 13 May 2011. At a later point in time, CCP instructors were often aviators that were directed to work in the Command Post and did not experience the same success in their careers.
[146] To prevent an abundance of citations from wing histories, I will summarize that from the 1960s through 1990s, bombing reliability generally maintained a reliability rate of 95 percent with the exception that in 1981, the 93 BW's history revealed reliability figures of 78-82 percent with seemingly little concern from those attending the meeting. This could have been due to the generally low-level of morale cited in Worden's *Rise of the Fighter Generals* on page 220, and the fact that the 93 BW was again facing severe personnel shortages.
[147] Funk, to the author, e-mail, 31 March 2011.

additional rating, although the process was eventually removed from the evaluation system.[148] As nuclear alert ended "ORIs shifted focus from the flying portion to aircraft generations because generations were much harder for the wing overall."[149]

For a short period of time during the Persian Gulf War, the SAC bomber alert force was unable to perform its mission. "Between March and 10 May 1991, SAC temporarily suspended the Alert Force because of Operation Desert Storm."[150] Just a short time later, this suspension would prove irrelevant, since on 28 September 1991, "President Bush directed a permanent drawdown of the [bomber] Alert Force."[151]

**Summary**

In assessing bomber preparation for Operation Desert Storm, it is possible to conclude that some bomber forces were prepared while others were not. "SAC officially reported that the B-52 CEP had been inadequate."[152] General Charles A. Horner was "not sure [B-52 breaching operations] did any good at all."[153] The B-52 had the worst score among Persian Gulf War aircraft in attacking strategic targets.[154]

Yet, when also considering that this was the first time B-52s were used in a conventional fight since the conflict in Vietnam, and given SAC's predilection for the low-level nuclear mission, the B-52 performed admirably when matched against a proper target and when provided precise coordinates. General Horner commented that "'[Ground guys] always ask for B-52s … Ground guys always ask for B-52s first.'"[155]

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[148] Dr. James M. Tucci (School of Advanced Air and Space Studies), interview by the author, 29 March 2011. Dr. Tucci served at SAC headquarters when officers received this special recognition. Colella, to the author, e-mail, 13 May 2011.
[149] Griffith, to the author, e-mail, 31 Mar 2011.
[150] Lloyd, *A Cold War Legacy*, 643.
[151] Lloyd, *A Cold War Legacy*, 643.
[152] Lake, *B-52 Stratofortress Units in Operation Desert Storm*, 75.
[153] Jamieson, Lucrative Targets, 129.
[154] Chan et al., *Operation Desert Storm: Evaluation of the Air Campaign*, 113.
[155] Jamieson, *Lucrative Targets*, 103.

Certainly the Iraqis saw the B-52 as a formidable threat, since it heavily influenced fielded Iraqi forces to capitulate.

By 1989, SAC had examined high-altitude bombing and refined it during Desert Warrior training on the Nellis ranges. There was little reason to withhold the exercise's lessons from the rest of the bomber force. Just like in Vietnam, the crews that deployed to support the Persian Gulf War attended the customary 3-day contingency training workshops at deployed locations, designed to familiarize crews with their operating environment. However, since crews did not rotate due to the short duration of the war, there was no opportunity to pass lessons from one unit to the next. The 42 BW crews taught the 93 BW crews about conventional procedures, but other Persian Gulf War bomber bases were not included in the training.

There are some lessons as to how commanders were able to balance mission requirements among competing interests. SAC training priorities were expressed in a large grouping of command-directed events that established the absolute minimum number of events necessary to ensure a unit was ready for its mission. SAC then allowed commanders the flexibility to tailor wing-directed events while also providing local commanders with the ability to shed extraneous missions, as was the case with contingency training for the 93 BW. Moreover, wing commanders could utilize synthetic training devices when a limitation on flight hours prevented accomplishing all flying training, although the simulators did not always replicate the airborne environment.

As B-52 wings gained additional conventional requirements, such as the Strategic Projection Force, the CALCM, Rapid Response Bombing, and the Bomb Your Own Base program, units were given freedom to experiment in new tactics which developed into specialized missions that were assigned to flights within a squadron, or to a squadron within a wing. Units were of course measured on how well they fulfilled their nuclear mission through ORIs while new conventional missions were

excluded from the inspection process. Specialization of unit missions was also reinforced in unit DOC statements by designating which missions held a higher priority, and thus demanded a higher level of proficiency. The entire unit was not required to train in multiple DOC missions up to equally high proficiency levels, due to the time necessary to develop proficiency in diverse missions. Training processes, such as the new CCTS progressive syllabus and 18-month MQT schedule, also allowed sufficient time for crew members to move from familiarization proficiency, to mission ready status. Wing commanders were charged with declaring when an individual was proficient. Commanders above the wing level were supportive of the training process by allowing local commanders to decide how they would disperse DOC tasks. For a relatively short period of time, SAC even organized wings based on a core mission to allow increased focus on important wartime skills. Periodically, commanders assessed their training programs to ensure they were meeting their stated purpose.

When faced with competing interests, SACs leaders allowed lower level commanders the opportunity to experiment with new employment and training procedures to ensure the B-52 remained lethal and flexible. Crews devoted a majority of their training effort toward those areas of the mission that were complex, while SAC used creative thinking to simplify those aspects of the mission that should remain simple. Once the crew force had demonstrated a new and supportable mission capability, they were included in new war fighting concepts and Operational Plans.

As the likelihood of combat drew near, SAC enhanced relevant training that would immediately apply to the combat environment whether that occurred during routine unit training, pre-deployment training, or in-place training at the deployed location. When the most immediate demands of the nation became the number one priority, SAC relaxed other mission requirements, such as alert, to allow the fighting force to use their time most efficiently. However, wing commanders

never ceased to track what was important to their bosses, and that was actually measuring mission accomplishment through bomb scores. The wing commanders understood that combat effectiveness was the measure of success, and when crews could perform their mission with alacrity, there was very little that could remain a challenge.

## Chapter 3

## Kuwait City to Tora Bora and Beyond

Within one month of the terrorist attacks on the World Trade Center and the Pentagon, strategic bombers were deployed in support of Operation Enduring Freedom (OEF) to destroy a global terrorist threat. Previous combat experiences, and adjustments to training processes, ensured the bomber force was ready to deliver precise, flexible, and responsive airpower in support of ground commanders and special operations forces. On 7 October 2001, B-52 crews from the 2d Bomb Wing's 20th Bomb Squadron launched attacks on national air defense systems and the terrorist support network in Afghanistan.[1] The operation in Afghanistan was unique for the Cold War-era bombers, because they were employing the USAF's newest precision weapons.

After the Persian Gulf War, the 1992 USAF *Bomber Roadmap*, in conjunction with the efforts of General Butler, commander of Strategic Air Command (SAC), charted a future course of conventional bomber development to respond "rapidly and decisively to security threats that may emerge in various regions of the world."[2] To achieve this goal, the bombers needed to add new weapons to provide precise standoff and direct-attack capabilities. These weapons were available, and the bomber force had been trained to use them, by the time the terrorist attacks occurred on 11 September 2001. With the addition of new methods to employ the most advanced precision weapons, the bomber crews added additional elements of complexity to their mission, a complexity that threatened to disturb the balance in bomber crew training for both nuclear and conventional missions.

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[1] 20 Bomb Squadron (ACC) Factsheet, 4 January 2008, http://www.afhra.af.mil/factsheets/factsheet.asp?id=9868.

[2] Department of the Air Force, *The Bomber Roadmap: Enhancing the Nation's Conventional Bomber Force* (June 1992), 1.

## The Influence of Technology

The Joint Direct Attack Munition (JDAM) was a technological breakthrough that added an element of precision targeting previously only available in expensive cruise missiles or inexpensive laser-guided bombs. Laser-guided bombs are limited by their ability to function through the weather, and JDAM provided a means to overcome meteorological limitations by using satellite Global Positioning System (GPS) information to strike targets accurately regardless of the weather.

JDAM was not fully integrated into the B-52 crew training process in 1999; hence the weapon was not used in Operation Allied Force (OAF). The exhaustive efforts of the weapon manufacturer and B-52 aircrews to solve problems associated with weight and balance, weapon-to-aircraft-to-aircrew communication, and release parameters, had culminated by 2000.[3] The B-52 aircraft acquired the avionics software package to support the employment of JDAM at the end of 1999.[4] Between February and July 2000, the 96th Bomb Squadron (BS) and the 340th Weapons Squadron—the B-52 detachment assigned to the USAF Weapon School—at Barksdale AFB were exploring how to employ JDAM.[5] The employment procedures for JDAM were unlike anything previously attempted. The use of JDAM involved new menu options, new release switches, new tactics, and a generally higher level of comprehension of aircraft systems and weapon management.

In executing a gravity weapon release, whether conventional or nuclear, the navigator directs the pilot to fly to a precise location in the sky in order to release the weapon and strike the target. Because of the

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[3] Col Parker W. Northrup III, Deputy Associate Director, Strategy and Plans Enterprise, and USAF Senior Service Advisor, Defense Threat Reduction Agency, Fort Belvoir, VA, to the author, e-mail, 12 May 2011. Since 1996, the B-52 community was working with Boeing to complete Operational Testing and Evaluation of JDAM in order to add it to the B-52 arsenal.

[4] Lt Col Michael E. Adderley, Commander, 5th Operations Support Squadron, Minot AFB, ND, to the author, e-mail, 5 April 2011.

[5] Adderley, to the author, e-mail, 5 April 2011.

JDAM's onboard guidance system, and its ability to maneuver in-flight once released from the aircraft, the aircraft only has to pass through the Launch Acceptability Region (LAR) or "basket," which might be up to five miles across and nine miles long. This capability not only increased flexibility for individual weapon releases, but also made it feasible to release multiple weapons on separate targets, within a single target area. While this should have made weapon releases much easier, when compared to gravity releases, it actually took the crews several months of experimentation to understand that the LAR was not a fixed point in space, but was dynamic and continuously moved in relation to aircraft heading and target location. Unfortunately, B-52, and even B-1, instrumentation providing cueing on the LAR's location was rather limited. The B-1 simply had a needle that pointed left or right, and the B-52's cueing system was similar.[6] Additionally, new avionics software significantly increased the number of menu options aboard the aircraft for targeting the weapon. The crew also had to keep a mental tally on which weapons were being released from the aircraft, since they could selectively release any number from a total of 12 weapons. To further complicate the mission, each weapon could have a different fuse setting, or even have a proximity sensor to initiate an explosion before impacting the ground. Lt Col Michael Adderley was one of the B-52 pilots that flew the first 96 BS JDAM training sortie and related the following experience: "It literally took us months to realize that the LAR was not a fixed point in space (even with an azimuth constraint), but a fluid bubble that was heavily dependent on the aircraft heading. Once we figured that out, the rest was easy. We had to educate the Weapons School instructors when

[6] Dr. Stephen E. Wright (School of Advanced Air and Space Studies), interview by the author, 29 March 2011. Dr. Wright was a B-52 crewmember that flew B-52Ds at Carswell AFB, Texas from 1979-1984 and transitioned to the B-52H before moving to Minot AFB, North Dakota in 1985. He later transitioned to the B-1 and squadron command while the B-1 still carried a nuclear mission.

we went through the course as students because they had not yet figured it out."[7]

The rest was relatively easy, until the B-52 was called upon to use the weapon in combat in OEF. The 20 BS was the first B-52 unit to employ the JDAM in combat, in Afghanistan, and had to overcome targeting problems associated with regional terrain. The JDAM is a *smart* weapon, but it is only as smart as the data it receives from its operators. Unfortunately, the special operations forces on the ground in Afghanistan were passing targets to the B-52 crews with incorrect target elevations, and this bad data adversely affected JDAM accuracy.

One innovative combat leader determined they could solve this problem by directing a weapon to strike the target with a 90-degree impact angle, in order to remove any elevation error.[8] Interestingly, the B-2 had used the JDAM in combat prior to this operation, during OAF, and B-2 operators were already aware of this tactic in the late 1990s, however, this information was not shared with other platforms.[9] In Afghanistan, once B-52's discovered this new tactic, the information rapidly spread to those platforms employing the JDAM, and it quickly became a lethal weapon for destroying Taliban and al-Qaeda strongholds.

One possible explanation for why it took longer for the B-52 force to integrate the JDAM fully is due to the fact that force structure and personnel changes following the Persian Gulf War reduced crew force manning for the 1991 through 1996 officer year groups (see fig. 1). The lack of aviators meant that when new weapons were added to the B-52, there were fewer lower-to-middle-rank aviators to institute the necessary

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[7] Adderley, to the author, e-mail, 5 April 2011.
[8] Adderley, to the author, e-mail, 5 April 2011. Lt Col Adderley stated "the 90-degree impact angle was 'invented' during the early months of OEF when the 20 BS discovered that the target elevations they were getting from the ground parties were off by upwards of 200 feet." He credits another B-52 aviator, Max Mitchell, with thinking of the 90-degree impact angle option.
[9] Col Robert A. Colella, National Defense University, Fort McNair, Washington, DC, to the author, e-mail, 13 May 2011.

training focus and tactics required to employ the weapons, especially when considering the need to overcome a SAC mindset that focused on standards to the detriment of tactics.

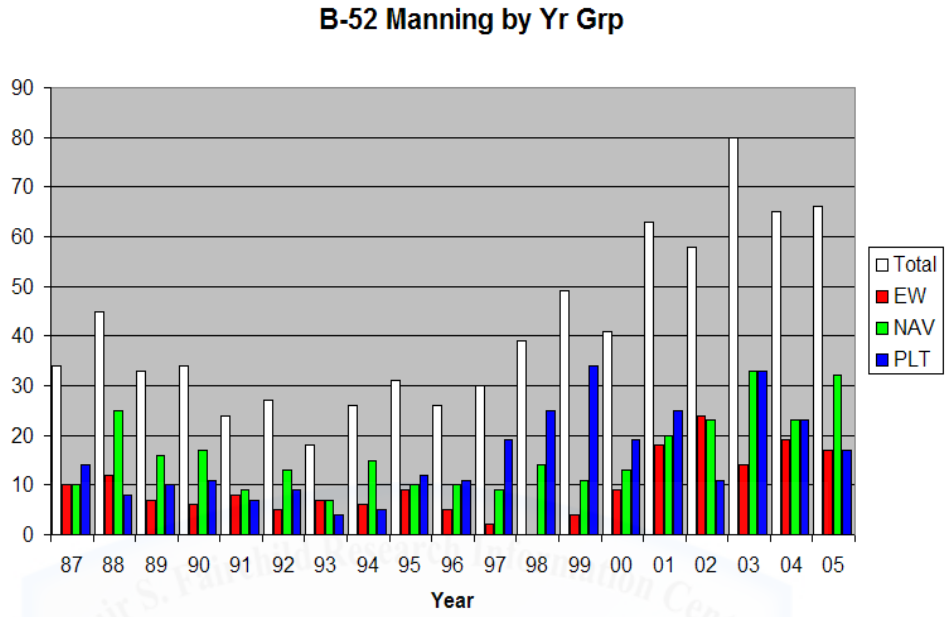


Figure 1. B-52 Manning by year group.

Source: Reprinted from Col Parker W. Northrup III slides on B-52 officer management, created 21 June 2007.

In the mid-1990s there were two opposing cultures in the B-52 community. The first group was comprised of those raised under the SAC system of standardization, where it was the SAC way, or it was wrong. The second group of aviators followed the mindset of Tactical Air Command (TAC), led by graduates of the USAF Weapons School, who taught aviators to be innovative problem solvers in the realm of attacking targets. The B-52 Weapons School was both a "repository of nuclear experience," and an "integrator of tactics."[10] The SAC culture dominated the formal flying institutions such that their notion of tactics was "taking off your [uniform] patches before you flew so they wouldn't get dirty."[11]

[10] Colella, to the author, e-mail, 13 May 2011.
[11] Colella, to the author, e-mail, 14 May 2011. Removing one's patches before a flight was originally used by crews to signal that they were training as if they were going on a

The nuclear mission left no room for error, which forced compliance with aircraft procedures and systems, but left little room for innovation and tactics. The SAC mindset was essential for instilling the B-52 crew force with system expertise, especially in regards to the nuclear mission. This focus served a useful purpose in that the crew force understood B-52 systems and spent laborious hours on nuclear alert studying Technical Orders (TO), SAC regulations, and items particular to the nuclear mission. If a crew were stuck at the aircraft for hours, because of maintenance repairs, it was not uncommon for the senior crewmembers to grill junior crewmembers on nuclear operations and aircraft systems.[12] This forced B-52 aviators to memorize procedures and actions that many can recall to this day. This level of focus, however, precluded officers from extemporaneous thinking, since they were merely required to recall guidance from TOs and regulations. The Weapons School graduates also had a high expectation of competency in aircraft systems and procedures, but they did not belabor this point. Somewhere between the two dominant thought patterns lies the optimum mix of procedural knowledge and tactical innovation.

The B-52 crew force developed tactics, techniques, and procedures for the JDAM in four to five months and then had just over one year from the time they learned how to employ the JDAM before using the weapon in combat. Yet it took some time before this new weapon was added as a core mission by incorporating it into the B-52 Formal Training Unit (FTU) which was the new version of SAC's Combat Crew Training Squadron. Between 1992 and 1995, the FTU underwent a significant revision to its training syllabus. In 1992, the FTU syllabus consisted of 10 nuclear

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combat mission. So the original group of folks that did this was actually serious about making positive changes for the bombers. However, the less motivated crews actually removed their patches to keep them clean and never embraced the mindset of training as if you are going to war.

[12] Colella, to the author, e-mail, 13 May 2011.

sorties and only two conventional sorties.[13] By 1995, the syllabus focus had been reversed, with 12 conventional sorties and two nuclear sorties.[14] One other holdover from the SAC era was the low-level mission which was completely removed from the FTU syllabus by June 2000, when the syllabus became primarily devoted to teaching B-52 students how to employ conventional gravity release bombs and the Conventional Air Launched Cruise Missile (CALCM) with the inclusion of one nuclear sortie.[15] Most FTU graduates then went to their gaining units for follow-on Mission Qualification Training (MQT) specific to that unit's mission.

Prior to operations in Afghanistan, B-52 units incorporated specialized weapon training into MQT. Recent graduates of the FTU quickly acquired specialized weapon training in accordance with the Designed Operational Capability (DOC) statement for their unit of assignment. In the 2d Bomb Wing, those assigned to the 20 BS were taught to employ the AGM-142 Have Nap, while those assigned to the 96 BS were taught to employ the AGM-84 Harpoon. Both units rapidly trained the new B-52 aviators on core weapons in preparation for unit mission certification by the wing commander. In 2001, JDAM and the nuclear mission were the two initial mission sets for certification. Because the B-52 employs a broad range of weapons, certification was usually limited to just a few weapons. Over time, the aviators acquired additional weapon qualifications through continuation training. Each additional weapon qualification added an element of complexity based on the method of employment and weight of effort required to understand how to configure and release the weapons.

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[13] Tyrell A. Chamberlain, "Transition of the B-52 bomber from SAC to ACC: a case study of transformation." School of Advanced Air and Space Studies Thesis, Maxwell AFB, AL: Air University Press, 2006), 52.
[14] Adderley, to the author, e-mail, 6 April 2011.
[15] Recollection of the author when assigned to the 11 BS, FTU, as a student pilot from June to December 2000; Maj Cameron L. Warren, Air Force Global Strike Command, Barksdale AFB, LA, to the author, e-mail, 4 May 2011. Maj Warren was an FTU student from December 2000 to April 2001.

In 2001, there were essentially four broad skills for releasing B-52 weapons. Gravity weapon training included Mk-82, Mk-84, M117, maritime mines, Cluster Bombs, B-83 and B-61 nuclear gravity weapons, and Laser-Guided Bombs (LGB). Cruise missile training included the nuclear Advanced Cruise Missile, the nuclear Air Launched Cruise Missile and its conventional twin the CALCM. Unique skill-set weapons included the AGM-142, and AGM-84 previously mentioned. The new joint-series weapons include the JDAM and a similar self-guiding Wind-Corrected Munitions Dispenser (WCMD) which is a Cluster Bomb Unit (CBU) with a smart guidance system provided by an internal navigation system and movable steering fins.

However, while the release system methodology provides one way to group the weapon types, the methods of employment also adds to the complexity. For instance, weapons are used to strike static versus mobile targets in order to achieve a desired effect based on the combatant commander's stated objectives. Multiple weapons can be utilized across functional airpower missions so a simple figure (fig. 2) can help illustrate how B-52 weapons can be employed in unique combat environments that require specialized training.

| Weapon timeline | Airpower Function / Weapon | Strategic Attack | Counter Air | Counter Land | Counter Space | Counter Sea | Info Ops | Surv Recon | Total | FTU | Direct Attack | Standoff Attack |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-52 aresenal in 2001 / Weapons in service before 2001, but 2001 is the base reference | GBU-10 | X | X | X | X | X | | | 5 | MQT | X | |
| | GBU-12 | X | X | X | X | X | | | 5 | MQT | X | |
| | JDAM V1/V3/V5 | X | X | X | X | X | | | 5 | 2003 | X | |
| | Mk-82, 2 variants | X | X | X | X | | | | 4 | 2001 | X | |
| | Mk-84 | X | X | X | X | | | | 4 | MQT | X | |
| | M117, 3 variants | X | X | X | X | | | | 4 | MQT | X | |
| | B-52 | | X | | | X | X | X | 4 | N/A | N/A | N/A |
| | CBU-87 | | X | X | X | | | | 3 | MQT | X | |
| | WCMD CBU-103, CEM | | X | X | X | | | | 3 | 2003 | X | |
| | CALCM | X | X | | X | | | | 3 | 2001 | | X |
| | CBU-89 | | | X | | | | | 1 | MQT | X | |
| | M-129 | | | | | | X | | 1 | ADV | X | |
| | WCMD CBU-104, GATOR | | | X | | | | | 1 | 2003 | X | |
| | WCMD CBU-105, SFW | | | X | | | | | 1 | 2003 | X | |
| | Mk-62 | | | | | X | | | 1 | MQT | X | |
| | Mk-63 | | | | | X | | | 1 | MQT | X | |
| | Mk-65 | | | | | X | | | 1 | MQT | X | |
| | ALCM | X | | | | | | | 1 | 2001 | | X |
| | B-61 | X | | | | | | | 1 | 2001 | X | |
| | B-83 | X | | | | | | | 1 | MQT | X | |
| Phased Out | **ACM** | X | | | | | | | 1 | MQT | | X |
| | **Harpoon** | | | | | X | | | 1 | MQT | | X |
| | **Mk-56** | | | | | X | | | 1 | MQT | X | |
| | **Have Nap** | X | X | X | X | X | | | 5 | MQT | | X |
| | Total (2001) | 12 | 11 | 12 | 10 | 10 | 2 | 1 | | | 18 | 5 |
| 2004 | GBU-28 | X | | | | | | | 1 | ADV | X | |
| 2006 | JASSM | X | X | | X | X | | | 4 | 2008 | | X |
| 2007 | GBU-38 | X | X | X | X | | | | 4 | MQT | X | |
| 2008 | TGP (AFRC IOC in 2002) | X | X | X | X | X | | X | 6 | ADV | X | |
| | CBU-107 PAW | X | X | X | X | | | | 4 | N/A | X | |
| 20XX | MALD | X | X | | | | X | | 3 | N/A | | X |
| | Total (2011) | 16 | 15 | 14 | 13 | 9 | 3 | 2 | | | 21 | 4 |

Figure 2. B-52 Weapons and Functions

Source: Created by the author based on personal experience and with input from other B-52 aviators.

Figure 2 is extremely useful for understanding why it is difficult for the B-52, and other dual-capable aircraft, to balance mission requirements. On the left side are the dates when a weapon was in the B-52 inventory. For the purposes of this paper, a starting point of 2001 is appropriate given the B-52's involvement in OEF. Four weapons were phased out between 2001 and the present. In 2006 and 2008, the B-52 gained significant precision capabilities in the Joint Air-to-Surface Standoff Missile and the LITENING II Advanced Targeting Pod. It is also worth noting that the USAF Reserve B-52, 93 BS, began operating this

targeting pod in 2002 such that they were able to use that capability in combat during Operation Iraqi Freedom in 2003.[16]

The orange highlights identify where a larger number of weapons fill multiple roles across airpower functions, and identify which airpower functions contain the greatest number of B-52 weapons. It is worth noting that the weapons with the greatest level of precision-strike capability filter across multiple functions. Also, a majority of B-52 weapons fall under the airpower function of strategic attack. Blue indicates a maturing technology and yellow highlights a doctrinal function not typically assigned to the B-52 force, but one which they could perform if tasked.

The red highlights indicate areas of the B-52 mission that are complex because of the technology used, or because the employment scenarios require a significant amount of practice and expertise. These employment scenarios usually involve dynamic and fluid situations where B-52 crews not only have to be adept at employing the weapon system, but must also integrate with other joint force actors to facilitate the destruction of assigned targets, while preventing collateral damage and fratricide due to proximity of non-combatants and friendly forces. In many of these dynamic situations, B-52 crews have to think carefully about the optimum target and weapon combination, while maintaining situational awareness of the combat environment. In 2007 and 2010, two USAF studies attempted to address mission complexity in light of existing resource limitations to help focus the combat air forces on the most desired missions and skill-sets to incorporate into routine unit training.

**Prioritizing Conventional Missions and Skill-Sets**

In 2007, then Brigadier General William J. Rew visited the combined force air component commanders (CFACC) across the globe,

[16] Maj Gavin A. Berne, 49 Test and Evaluation Squadron, Barksdale AFB, LA, to the author, e-mail, 3 May 2011.

except US Strategic Command, to assess which skills these war-fighting commanders expected from the forces designated to execute deliberate and contingency war plans. The purpose of the study was to determine which skills required high proficiency, proficiency, and familiarization for multirole airframes, since many units carried multiple DOC tasks without specifying any sense of priority.[17] The Warfighter Support Team conducting the study, along with the general, wanted to use the results to "suggest DOC statement [and Ready Aircrew Program] RAP Tasking alignment [for] possible refinements to unit [Air and Space Expeditionary Force] AEF training.[18] The overall results of the study identified an "increased requirement for non-preplanned attack skills against fixed and mobile targets."[19] The study then provided a desired breakdown of missions, munitions, and training focus for each platform in terms of a proficiency scale.

According to the 2007 study, the number one priority for the B-52 was high proficiency in strategic attack, air interdiction, and offensive counter air, using the B-52's standoff attack weapons and the newest joint-series of smart weapons. In descending proficiency, the study selected sub-functions of the counter land mission—dynamic targeting, kill-box interdiction, and close air support—to identify a weight of effort for training priority. While informative, this did little to ease the training burden for B-52s, because the three desired highly proficient skill-sets encompass a large number of weapons when referencing Figure 2. Additionally, the sub-functions are relatively similar for the B-52, with regards to how the weapon system will be used, with minor differentiation in the command and control source when executing the mission. The B-52 simply needs a set of coordinates to strike targets

[17] Brig Gen William J. Rew, Commander, 57 Wing, "USAF Warfare Center and the Warfighters Expectations and Recommendations" (Realistic Training Review Board Slides, Nellis AFB, NV, 2007), slide 7.
[18] Rew, "USAF Warfare Center and the Warfighters Expectations," slide 9.
[19] Rew, "USAF Warfare Center and the Warfighters Expectations," slide 14.

among the sub-functional categories, with special attention needed when conducting close air support, in order to understand the ground environment and prevent collateral damage. This study informed the B-52 crew force that they needed to focus their training on both "preplanned and non-preplanned attack" and becoming "proficient in in-flight weaponeering and prosecution of un-planned targets," while asking for proficiency across virtually every weapon.[20] On the positive side, the study did highlight a decline in the need for aerial delivery of sea mines, although the maritime component commanders might disagree. The B-52 needed another approach at distinguishing the required skill-sets.

In 2010, Air Combat Command (ACC) produced a similar study to identify mission essential capabilities for CFACCs, by conducting an "end-to-end review of training priorities to ensure appropriate alignment exists with CFACC war planning expectations."[21] The ACC team combined CFACC inputs with aircrew interviews to determine mission prioritization and weight of effort in order to achieve three proficiency levels: highly proficient, proficient, and familiarization. This study neglected to specify the desired weapons the war-fighting commanders might require, but did a better job distinguishing between proficiency levels across the air power functions.

Additionally, since Air Force Global Strike Command (AFGSC) recently acquired the nuclear bombers from ACC, by the time the ACC study team produced its results, the ACC team avoided specifying the necessary bomber skill-sets and usurping authority from AFGSC. Since the ACC team had the data on bombers, they were able to provide the data for this thesis. The number one skill-set was identified as "nuclear" within the highly proficient category as this study included inputs from

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[20] Rew, "USAF Warfare Center and the Warfighters Expectations," slide 31-34.
[21] Air Combat Command A3T, "RAP Realignment with CFACC Warplanning Expectations" (Training Division Slides, Langley AFB, VA, 9 March 2010), slide 6. C-NAF and CFACC are used interchangeably between some of the studies and the distinguishing feature occurs when a CFACC does not come from the USAF. In all studies, the desired combat capability came from C-NAFs.

US Strategic Command and most likely came from political pressures, following the 2007 transfer incident, emphasizing the nuclear mission. Air interdiction, offensive counter-air surface attack, and strategic attack filled the number two "highly proficient" category, with dynamic targeting filling the number three priority.[22] Similar to the 2007 study, the ACC study placed differing levels of proficiency across the counter land function. Close Air Support, Psychological Operations, and Suppression of Enemy Air Defenses came in at the "proficient" level, while counter sea occupied the "familiarization" level.[23] The problem with the results indicated in the ACC report is that virtually every skill-set was highly desired by CFACCs.

Both studies were extremely useful for identifying necessary skill-sets but then limited their results by lumping capabilities under an encompassing airpower function. The two studies were also not identical in intent. Brigadier General Rew's study essentially identified CFACC priority requirements, while the ACC study reaffirmed CFACC priorities and added a training weight of effort to achieve different levels of mission proficiency. Unfortunately, the ACC study highlights that achieving the status of "proficient" and "highly proficient" exceeds both the realistic number of monthly training opportunities as well as the funded flying hour program.[24] For example, in order for an inexperienced B-52 pilot to become "proficient," the pilot would need to fly 9.5 sorties and six simulator missions within one month, for a total of 15.5 events, while the realistic number of training opportunities in one month is only 7.5 events.[25] Furthermore, the flying hour program is only funded at 2.2

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[22] Air Combat Command A3T, "RAP Realignment with CFACC Warplanning Expectations," slide 31.
[23] Air Combat Command A3T, "RAP Realignment with CFACC Warplanning Expectations," slide 31.
[24] Air Combat Command A3T, "B-52 Optimum Mix of Flight Hours, Simulators, Distributed Mission Operations" (Training Division slides, Langley AFB, VA, 2010), slide 7.
[25] Air Combat Command A3T, "B-52 Optimum Mix of Flight Hours, Simulators, Distributed Mission Operations," slide 7. The MEC study treated flying events and

sorties per month, in addition to the 1.5 simulator missions per month that an aircrew member will normally perform.[26] To become proficient, an inexperienced pilot would need to have a flying hour program funded at $3.55 million per month compared to the currently funded $1.38 million per month.[27] Those figures account for training to reach the "proficient" level, and acquiring "highly proficient" status requires even more training.

Another interesting point from Figure 2 is that a majority of B-52 weapons serve a direct-attack role rather than the envisioned standoff attack role for the non-stealthy bomber. To maintain proficiency in B-52 weapon employment, significantly more time is necessary in training in the direct-attack role. The combined inputs of the previously mentioned studies highlight the importance of employing bombers in a dynamic environment using direct-attack weapons.

Regardless of which weapon is used, there is transfer value in exercising the command, control, and execution process of dynamic targeting. The addition of an onboard targeting pod further provides the B-52 with an enhanced capability to employ multiple weapons in a dynamic targeting environment. Becoming proficient in targeting pod operations requires a significant weight of effort in training, and this fact was not included in the two studies despite acknowledging the need "to find, fix, and kill mobile targets [and being] proficient with [Advance Targeting Pod] ATP."[28] The CFACC's highly desired weapons are relatively easy to plan and release, notwithstanding the difficulty of dynamic targeting, while the lower priority weapons require significantly more planning effort before flying the mission.

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simulator events as a one-for-one swap capability meaning it would be difficult to accomplish more than 7.5 events per month whether flying or in a simulator.
[26] Air Combat Command A3T, "B-52 Optimum Mix of Flight Hours, Simulators, Distributed Mission Operations," slide 7.
[27] Air Combat Command A3T, "B-52 Optimum Mix of Flight Hours, Simulators, Distributed Mission Operations," slide 7.
[28] Rew, "USAF Warfare Center and the Warfighters Expectations," slide 33.

The last point to emphasize is the increase in the number of potential tasks between the 2001 and the present. With the addition of vital standoff attack weapons and a targeting pod, there are 14 new weapon-airpower-function tasks for the B-52. Within these new weapons, the difficulty of mission planning and execution adds further training requirements for the B-52 force. The column marked "FTU" in Figure 2 lists the dates in which various weapons were added to the B-52 Formal Training Unit syllabus, thus adding those weapons as a core capability for the bomber. Weapons marked with "MQT" are covered during unit Mission Qualification Training. Weapons marked with "ADV" indicate a special capability requiring intensive mission planning expertise or a graduated capability to be mastered, once a crew is comfortable in other mission areas. All of these tasks are demanding and require a significant weight of effort in order to provide flexible, responsive, and precise combat capability for combatant commanders. Nuclear weapons do not require the same weight of effort to employ, due to the static nature of the targets and relatively simple weapon system management. However, there remains a measure of complexity in the nuclear mission, while there is also transfer value between how the weapons are employed.

In May 2011, Air Force Global Strike Command (AFGSC) released its version of a training priority matrix that embraced and enhanced the concepts of the two previous studies. The AFGSC matrix matched a single mission with a set of weapons and offered additional optional weapons. One clear distinction from previous studies is that the AFGSC concept designates the counter sea mission as a secondary mission but does not specify a level of proficiency for remaining skills sets. See figure 3 for a comparison of the three mission complexity matrices.

| 2007 Gen Rew Study | | | 2010 ACC Study | |
|---|---|---|---|---|
| | Priority Missions | Priority Weapons | Proficiency | Priority Missions |
| | Strategic Attack /Airborne Interdiction /Offensive Counter Air | JASSM | High Prof 1 | Nuclear |
| | | CALCM | High Prof 2 | Airborne Interdiction /Offensive Counter Air-Surface Attack /Strategic Attack |
| | | JDAM GBU-31 | | |
| | Dynamic Targeting | JDAM GBU-38 | | |
| | Killbox Interdiction | WCMD CBU-105 | | |
| | Psychological Operations | WCMD CBU-103/104 | High Prof 3 | Dynamic Targeting |
| proficiency | Close Air Support | M-129 | Prof 1 | Close Air Support |
| FAM | Counter Sea-Aerial Interdiction of Maritime Targets | GBU-10/12 | Prof 2 | Psychological Ops |
| | | Mk-82 | Prof 3 | Suppression of Enemy Air Defense |
| | | M117 | | |
| FAM | Counter Sea-Aerial Mine Laying | GBU-28 | FAM | Counter Sea |
| | | Mk-56/62/63 mines | | |

| 2011 AFGSC Study | | | |
|---|---|---|---|
| proficiency | Priority Missions | Priority Weapons | Optl Wpns |
| Primary | Nuclear | ALCM | B-61, B-83 |
| | Airborne Interdiction | JDAM, WCMD, GP | TGP, LGB |
| | Offensive Counter Air-Surface Attack | CALCM, JASSM JDAM, WCMD, LGB, GP | MALD, TGP, LGB |
| | Strategic Attack | CALCM, JASSM | MALD, GBU-28 |
| | Close Air Support | JDAM, WCMD, GP, TGP LGB | |
| | Psychological Ops | MALD, M-129 | Show of Force |
| | Suppression of Enemy Air Defense | CALCM, JASSM, MALD, Elec Attack | |
| Secondary | Counter Sea | Mines, Aerial Interdicion of Maritime Targets | TGP, LGB, JDAM, WCMD |

| Legend |
|---|
| GP = General Purpose Bombs (Mk-82, M117) |
| M-129 = leaflet bomb |
| MALD = Miniature Air-Launched Decoy |
| TGP = Targeting Pod |

Figure 3. B-52 CFACC Priority Mission Comparison

Source: Adapted from: Rew, "USAF Warfare Center and the Warfighters Expectations," slide 31-32; Air Combat Command A3T, "RAP Realignment with CFACC Warplanning Expectations," slide 31; Air Force Global Strike Command A3T, "AFGSC Syllabus Conference CNAF Priority Conversion," (Training Division Slides, Barksdale AFB, LA, 6 May 2011), slide 1.

## The Nuclear Mission

The most significant change to the B-52 nuclear mission occurred in 1991, when the bombers came off of full-time nuclear alert. Fortunately, some of those SAC-trained nuclear warriors who performed the nuclear alert mission remained in the B-52 force to provide core expertise, as new B-52 aviators were absorbed into the community. If one considers that it took about three to four years to complete initial pilot or navigator training, B-52 qualification, and finally gain experience

in alert duties, it is no surprise to see the gradual erosion of nuclear skills reach their peak in 2007-2008, given a standard 20-year USAF career. This erosion was especially evident to Major General Douglas L. Raaberg, who conducted the Command Directed Investigation of the unauthorized B-52 nuclear weapon transfer incident. On multiple occasions during his investigation, General Raaberg found that "processes had superseded procedure."[29] This is indicative of the type of erosion that occurred in the nuclear mission between 1991 and 2007, as one of the multitudes of competing requirements during that time was "commander-focus on the conventional mission because that mission was more relevant after 1991."[30] Events in Bosnia and Kosovo, Afghanistan, and Iraq required commanders to shift training focus to the immediate threat, and this shift contributed to the erosion of nuclear expertise.

In the nuclear mission, training must focus on precise and descriptive procedures that detail every action to be taken when working with nuclear weapons, with any equipment used for the nuclear mission, and with the people who perform the mission. General Raaberg found that "dual-DOC units were still responsible for maintaining nuclear skills, but those skills were not maintained."[31] For example, SAC's last major command-wide nuclear exercise took place in 1987 and the next major exercise, called Global Guardian, occurred in 1996 under US

[29] Maj Gen Douglas L. Raaberg, interview by the author, 2 May 2011. In one instance, a bomb wing had previously failed an inspection because security forces did not satisfactorily protect nuclear weapons due to an overzealous inspection scenario. As a result, a process was added to the security forces standard operating procedures to first cordon an area before verifying the status of the nuclear weapons which violates a nuclear procedure. Their process for protecting the weapons superseded a nuclear procedure of verifying weapon status before allowing additional personnel with access to the weapons. The security force members did not have the authorization to implement a new process that seemed to make sense to them given the importance of defending the nuclear weapons making it hard to fault them. Their process was perhaps a good idea but it had not been authorized.

[30] Maj Gen Douglas L. Raaberg, interview by the author, 2 May 2011.

[31] Maj Gen Douglas L. Raaberg, interview by the author, 2 May 2011.

Strategic Command.[32] Some of the problems General Raaberg found were an absence of core expertise, a process that did not appropriately organize, train, and equip the mission, and even after the incident, a functional community that did not understand the importance of resourcing the appropriate personnel expertise to nuclear units in order to allow recovery.[33] General Raaberg concluded that "16 years of erosion will require 16 years to recover."[34]

**Nuclear Mission Complexity**

There are different levels of complexity within the nuclear mission, depending on where a person works within a nuclear bomber wing. All personnel are held to the same high standards of maintaining nuclear procedures, but due to a lack of daily exposure to nuclear weapons, and nuclear equipment, some personnel are involved in other mission sets that simultaneously require a significant weight of effort for training and readiness.

For B-52 aviators that perform the nuclear mission, complexity comes with generating aircraft under strict nuclear procedures and then understanding the command and control process that directs actions within the nuclear mission. Both of these skills are tested and verified in multiple inspection regimes. Nuclear Surety Inspections (NSI) occur every 18 months and "are performance and compliance-based inspections and are conducted to evaluate a unit's ability to *manage nuclear resources* while complying with all nuclear surety standards" (emphasis added).[35]

> The NSI is designed to *certify a unit's continued capability to Perform its assigned nuclear mission*. It *inspects* a unit's capability to *manage nuclear resources* while complying with

[32] Lt Col Rita Clark, Vincent A. Giroux, Jr., and Todd White, *History of the United States Strategic Command*, Command Historian Office, 1 June 1992—1 October 2002, 50, http://www.stratcom.mil/files/ History.pdf.
[33] Maj Gen Douglas L. Raaberg, interview by the author, 2 May 2011.
[34] Maj Gen Douglas L. Raaberg, interview by the author, 2 May 2011.
[35] Air Force Instruction (AFI) 90-201, *Inspector General Activities*, 21 April 2010, 46, 64.

> applicable nuclear surety rules governing their nuclear mission. Additionally, a NSI inspects a unit's capability to safely and reliably *receive, store, transport, secure, maintain, load, mate, lock/unlock, test, and render safe nuclear weapons*. Missile launch crews, aircrews, command post controllers and release teams must demonstrate their *knowledge of weapon acceptance procedures*, nuclear weapon system *safety rules*, and *nuclear weapon control order handling and authentication procedures*.[36] (emphasis added)

The Nuclear Operational Readiness Inspection (NORI) "is a performance-based readiness evaluation of nuclear-tasked units which support United States Strategic Command (USSTRATCOM) and Joint Chief of Staff (JCS)-directed OPLANs."[37] NORIs are conducted every 36 months and "require units to demonstrate their operational capability of nuclear and nuclear-support in a time-constrained environment."[38] Table 6.1 in AFI 90-201 lists the various graded areas for a NORI, ranging from command and control, maintenance, nuclear generation, security, managing resources, and a small subset under employment called "mission execution" which measures a "Unit's ability to complete assigned operational tasks."[39] Assigned operational tasks are found in unit DOC statements, and "NORIs will execute to the DOC statement."[40]

The NSI and NORI should provide a holistic approach to measuring unit readiness for the nuclear mission. The problem, though, is that these inspections duplicate each other in some respects, aspire to inspect certain areas but fail, and finally, neglect to inspect the areas they were designed to evaluate.

In 2008, Gen Larry D. Welch, USAF, retired, led the Defense Science Board Permanent Task Force on Nuclear Weapons Surety in a review of the nuclear inspection regime to find deficiencies and

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[36] AFI 90-201, *Inspector General Activities*, 48.
[37] AFI 90-201, *Inspector General Activities*, 64.
[38] AFI 90-201, *Inspector General Activities*, 64.
[39] AFI 90-201, *Inspector General Activities*, 64-66.
[40] AFI 90-201, *Inspector General Activities*, 66.

recommend improvements. "The Task Force found it difficult to distinguish clearly between the expectations for NSIs and NORIs of bomber units" due to an overlap that developed between the criteria used in each inspection.[41] The overlap between inspections occurred after 1995, when ACC added NORI items to the NSI to account for the extended time interval between a NORI.[42] Previously, SAC ORIs were conducted every 18 months and "measured the [unit's] ability to conduct the full range of nuclear operations within prescribed time limits to include: full unit force generation, launch, refueling, navigation to the target, and scored simulated target attack."[43] Under ACC, NORIs occurred every 36 months where "a full squadron is generated [and] aircrews and certified command post (CP) controllers are tested on nuclear control order procedures."[44] By adding NORI items to NSIs, commanders were able to develop more relevant assessments of their assigned nuclear forces. Unfortunately, combining inspection items became "counterproductive in that these activities are conducted under rules not consistent with generation requirements," and the end result serves "neither the NSI nor NORI purposes."[45]

To ameliorate the situation, the Task Force recommended combining the NSI and NORI and conducting the inspection every 18 months to minimize resources devoted to conducting the inspections, and to minimize "impact on the inspected unit."[46] To solve the problem, where processes superseded procedures, the Task Force also recommended expanding technical manual procedures telling people how

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[41] Gen Larry D. Welch, USAF (ret), *The Defense Science Board Permanent Task Force on Nuclear Weapons Surety Report on: Nuclear Weapons Inspections for the Strategic Nuclear Forces*, (Washington, DC: Office of the Secretary of Defense For Acquisition, Technology, and Logistics, December 2008), 17, http://www.acq.osd.mil/dsb/reports/ADA491505.pdf.
[42] Welch, *Nuclear Weapons Inspections*, 29.
[43] Welch, *Nuclear Weapons Inspections*, 28.
[44] Welch, *Nuclear Weapons Inspections*, 28.
[45] Welch, *Nuclear Weapons Inspections*, 30, 32.
[46] Welch, *Nuclear Weapons Inspections*, 35.

to do something, not what to do, while restoring "the clear direction formerly embodied in Air Force regulations on nuclear operations and inspections."[47] Further consideration should also be given to embracing the inspection criteria used before 1992, including aerial refueling, navigation, time control, and simulated attacks, in order to complete the inspection process as expressed in AFI 90-201, since both inspections cease to evaluate aircraft once they become airborne. Instead, the NORI measures reliability programs, aircraft generation, and the ability to decipher presidential nuclear command and control guidance via complex Emergency Action Procedures, which stand in stark contrast to the command and control process of a previous generation.

Nuclear command and control is a complex process, and the complexity preserves the security of the system and provides flexibility to decision makers. However, the process should not be so complex that those using the system have to rely on additional notes and memory aids to assist their processing of presidential directives over the use of nuclear weapons. One B-52 crewmember that performed the nuclear mission under SAC and in the post-SAC era, found the process to be unnecessarily complicated. "We didn't have bomber notes or other such nonsense. You would copy your emergency action message, and enter the checklist which would lead you through the process from start to finish. It was very straightforward and simple. I actually was shocked when I came back to the BUFF in 2004 and went through the certification after my requalification training. I couldn't believe how 'fornicated' up it had become."[48]

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[47] Welch, *Nuclear Weapons Inspections*, 10, 38.

[48] Ronald L. Funk, 49th Test Squadron, Barksdale AFB, LA, to the author, e-mail, 28 March 2011. Ron "Rofu" Funk was a B-52 crewmember that performed nuclear alert at Mather AFB from 1986-1988 before that wing converted to the conventional-only mission and he then performed alert under ACC during inspections and exercises. Paul A. Griffith, 2d Operations Support Squadron, Barksdale AFB, LA, to the author, e-mail, 31 Mar 2011. Paul Griffith performed nuclear alert duties under SAC and again during nuclear exercises under ACC and noted that command and control messages became less "black and white" during nuclear inspections as the flying mission became easier

Weapon release procedures are not complex, as there is transfer value between releasing freefall ordinance, whether nuclear or conventional, as well as between cruise missiles, whether nuclear or conventional. One complex aspect of cruise missile delivery is system management, due to the flexibility of options provided to decision makers. If decision makers choose to limit the level of damage they want to inflict in a nuclear war, the B-52 crew can launch some missiles while retaining the rest. In designating which missiles to launch, or if certain missiles malfunction and need to be covered by another missile, or a missile from another aircraft, the B-52 crew has an efficient process for managing retargeting options. This same process is nearly identical, whether using conventional or nuclear missiles. In fact, B-52 crews practice retargeting cruise missiles on every cruise missile sortie and simulator profile. However, since missile retargeting is the most complex aspect of missile employment, it is a perishable skill that requires preparation and training. Simulators provide an excellent means for practicing this retargeting exercise without having to expend additional flying hours.

**Organize, Train, and Equip**

The USAF as a whole is presently facing tighter budgets and must find ways to achieve the desired level of training despite a reduction in annual flight hours. In 2011, there is roughly "50 percent less RAP training for more complex missions" as compared to 1992.[49] Already in 2011 there has been a 16 percent cut to annual flying hour programs Air

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with the move towards nuclear standoff weapons. During an informal poll taken amongst B-52 aviators from 18 to 22 April 2011, out of 47 aircrew questioned, 51 percent found the nuclear command and control process to be difficult, 26 percent found it ambiguous, and 11 percent thought the process was broken, while 13 percent found it to be perfect or simple.

[49] Air Force Global Strike Command A3T, "Impact of Flying Hour Cuts on AFGSC Ready Aircrew Program (RAP)" (Training Division slides, Barksdale AFB, LA, February 2011), slide 2.

Force-wide, with an additional five percent cut expected for 2012.[50] The 16 percent reduction in flying hours "places nuclear bomber and core conventional readiness at risk" and the additional five percent cut "will directly impact AFGSC nuclear bomber readiness, erode core mission competencies, [and] limit secondary mission qualifications to below [combatant numbered air force] requirements."[51] These problems are not occurring unexpectedly, since there have been significant cuts and force reductions since 2005.

In 2005, Program Budget Decision (PBD) 720 "proposed reducing the active force by about 40,000 personnel to meet Air Force recapitalization and modernization requirements."[52] At the time, the 2d Maintenance Group at Barksdale AFB, Louisiana had nearly 100 percent manning with the enlisted members of the 2d Aircraft Maintenance Squadron at 96 percent strength.[53] On the flying side, the 2 BW was able to execute all flying hours but was unable to complete all RAP requirement sorties for the first time since at least 2000.[54] Between 2007 and 2010, the RAP sortie rate decreased from 92 percent, to 78 percent, to 74 percent, and finally ending at 78 percent as the wing progressively decreased in its ability to execute programmed flying hours, thus ending up at an 84 percent flying hour execution rate by 2010.[55] The PBD 720 cuts took place between 2005 and 2007 where a noticeable drop occurred in the 2 BW's ability to execute its flying mission, reaching a low point in 2010, with a continuing negative outlook for 2011 and

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[50] Air Force Global Strike Command A3T, "Impact of Flying Hour Cuts on AFGSC Ready Aircrew Program (RAP)," slide 5.
[51] Air Force Global Strike Command A3T, "Impact of Flying Hour Cuts on AFGSC Ready Aircrew Program (RAP)," slide 2 and 3.
[52] Air Force Audit Agency, *Air Force Personnel Reductions*, Audit Report F2008-00040FD4000 (12 May 2008), i, http://www.foia.af.mil/shared/media/document/AFD-100528-099.pdf.
[53] 2d Bomb Wing History, Jan – Dec 2005, Call # K-WG-2-HI V.1, IRIS # 1162090, (Maxwell AFB, AL: USAF Collection, AFHRA, 2009), 114-117.
[54] Air Force Global Strike Command A3T, "Impact of Flying Hour Cuts on AFGSC Ready Aircrew Program (RAP)," slide 8.
[55] Air Force Global Strike Command A3T, "Impact of Flying Hour Cuts on AFGSC Ready Aircrew Program (RAP)," slide 8.

beyond. The present plan uses provisions within the RAP using probation allowances to fly fewer required sorties for two months, and then achieving the RAP requirement in the third month, so the crew member does not regress and remains qualified for an inspection.[56] This tactic means the aviators look good on paper, when in reality they are not getting the proper level of training as intended by the RAP.[57] While the number of assigned aircrew has not decreased during this period, and thus the required level of training has not decreased, the total available flight hours shrunk from an average of 10,700 hours and 1,450 sorties per year from 2000 to 2005, to 6,900 hours and 1,100 sorties in 2008 and 2009.[58] One change which slightly accounts for a decrease in flying hours occurred by the end of 2009, when the AFRC B-52 squadron at Barksdale AFB assumed the duties of the B-52 Formal Training Unit in a CSAF approved Total Force Integration initiative, leaving the 2 BW responsible for providing flying hours to only its two operational squadrons, the 96 BS and 20 BS.[59]

There seems to exist a perpetual disconnect between the number of missions the nuclear bomber wings must support and the amount of resources being funded for the wings. In a 2008 report, one bomb wing commander reported that "the wing's assigned crew chief manning was only at 67 percent of its authorized level—resulting in an inability to fly approximately 20 percent of the [Fiscal Year] FY08 training sorties—limiting aircrew proficiency and severely impacting combat readiness."[60]

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[56] Air Force Global Strike Command A3T, "RAP Realignment with C-NAF War Planning Expectations," (Training Division Slides, Barksdale AFB, LA, September 2010), slide 7.
[57] Air Force Global Strike Command A3T, "RAP Realignment with C-NAF War Planning Expectations," slide 7.
[58] Air Force Global Strike Command A3T, "RAP Realignment with C-NAF War Planning Expectations," slide 7.
[59] SSgt Jeff Walston, "'Strato' school: 93rd Bomb Squadron approved as formal B-52 training unit," *Citizen Airman*, June 2009, http://findarticles.com/p/articles/mi_m0PAK/is_3_61/ai_n32098270/?tag=content;col1.
[60] James R. Schlesinger, *Secretary of Defense Task Force on DoD Nuclear Weapons Management Phase I report: The Air Force's Nuclear Mission* (Arlington, VA: Secretary of Defense Task Force on DoD Nuclear Weapons Management, September 2008), 53.

By 2011, crew chief manning increased to an average 79 percent across AFGSC, a sharp increase from February 2010 when the average was 63 percent.[61] Fortunately, there is a forecast that crew chief manning will reach 85 percent by the end of fiscal 2011, as the Air Force Personnel Center attempts to level AFGSC crew chief manning to reflect the world-wide crew chief manning level of 90 percent, instead of its present situation where the "bomber crew chief is the most undermanned career field."[62] The new crew chiefs assigned to the bomber wings, like Barksdale AFB, are largely 1-level technical school graduates, and transfers from fighter weapon systems, who revert to 1-levels, because of the change from the fighter to the heavy aircraft crew chief Air Force Specialty Code designation.[63] Between August 2007 and February 2010, there appeared to be insufficient support for the bomber mission in terms of correcting the ailing maintenance situation.

In December 2008 after releasing his annual CSAF Vector, General Norton A. Schwartz said "Maintaining accountability and improving stewardship of the Air Force's nuclear program is the top priority."[64] In August 2009, along with the formal standup of AFGSC, General Schwartz made the nuclear mission his number one priority in highlighting that "retention has a lot to do with perceptions of how important people's work is [further noting that] we've worked very hard to make it clear to those who still serve in this command that their work is, in fact, important to the country's defense and that it will continue to be

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[61] Air Force Global Strike Command A4, "Crew Chief Manning" (Aircraft Systems Maintenance Branch Slides, Barksdale AFB, LA, April 2011), Slide 2.
[62] Air Force Global Strike Command A4, "Crew Chief Manning," Slide 4. Air Force Global Strike Command A4, "Talking Paper on Crew Chief Manning" (Aircraft Systems Maintenance Branch, Barksdale AFB, LA, April 2011).
[63] Col David E. Foote, Deputy Commander, 2d Maintenance Group, Barksdale AFB, LA, to the author, e-mail, 9 May 2011.
[64] SSgt Matthew Bates, "Re-invigorating nuclear enterprise a top priority," *Air Force Print News Today*, 4 December 2008, http://www.af.mil/news/story_print.asp?id=123126602 (accessed 1 May 2011).

so for an extended period."[65] On 4 July 2010, General Schwartz made it his number one priority to "continue to strengthen the Air Force nuclear enterprise" to include appropriate focus and support while acknowledging that "it must be properly sustained and funded."[66] The problem of maintaining nuclear focus surfaces, when CFACCs are not satisfied with bombers arriving in their theater unprepared for conventional tasks.

**Competing Priorities**

A 2004 memo from the Deputy CSAF to the Deputy Chief of Naval Operations said the USAF would support counter-sea missions as reflected in operational plans to include bomber delivery of sea mines and assault breaching weapons.[67] As AFGSC officers are rewriting unit DOC statements to ensure they reflect operational planning tasks, some CFACC organizations are concerned when AFGSC places missions like counter-sea and aerial mining in a lower priority status.[68] The CFACCs do not understand why the B-52, with a proven mining capability, cannot meet their desired requirements.

One of the reasons why some B-52 crew members are not certified in certain missions, like counter-sea, comes from that fact that during monthly nuclear exercises, there is very little flying, since the purpose of the exercise is to conduct practice written tests on nuclear command and control procedures, review processes, and generate aircraft. For example, the 5 BW at Minot AFB, North Dakota completed a NORI on 13 November 2010 and deployed to Guam the following week as a part of

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[65] Michael Hoffman, "New command wants airmen for nuclear mission," *Air Force Times*, 17 August 2009, http://www.airforcetimes.com/news/2009/08/airforce_nuclear_081709w/ (accessed 1 May 2011).
[66] Gen Norton A. Schwartz, CSAF's Vector, (4 July 2010), http://www.af.mil/information/viewpoints/ csaf.asp?id=603 (accessed 1 May 2011).
[67] Deputy CSAF to Deputy CNO, memorandum of agreement on principles governing the air force combat aircraft aerial delivery of navy and air force weapons in support of maritime operations under agreements between the department of the navy and the department of the air force, 29 March 2004, annex 1 page 1.
[68] Maj Thomas Stayer, Air Force Global Strike Command, Barksdale AFB, LA, to the author, e-mail, 4 May 2011.

the Pacific Continuous Bomber Presence mission.[69] One B-52 crewmember from Minot commented that "the 69 BS is completing a NORI right now and then deploying to Guam in 2-3 weeks … tough to concentrate on the conventional preparation when your focus is not in that direction."[70]

Previously, the wing completed an NSI in August 2010 and then conducted a week-long NORI preparation exercise in September and again in October, leaving only 14 flying days in September, 12 in October and four in November to prepare for the Guam deployment.[71] There were no additional flying opportunities to prepare for this AEF-like tasking, and the unit had to conduct conventional weapon training during the fly-off portion of each nuclear exercise, just to keep the crew members combat mission ready and thus able to deploy.[72] It was not possible to qualify every deployable crew member in the counter sea-mining mission, because the unit lacked the available time and training sorties to ensure readiness.

Certification in aerial mining is relatively simple as B-52 crews need only fly a few low-level over-water sorties under instructor supervision while practicing sea mine employment. However, planning associated with seeding a minefield is incredibly complex and this planning function usually resides with specially trained aviators in Operations Support Squadrons and graduates of the USAF Weapons School. A few options to handle the counter sea mission are to wait until

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[69] Eloise Ogden, "Base's newest B-52 squadron to deploy," *Minot Daily News*, 11 November 2010, http://www.minotdailynews.com/page/content.detail/id/549148/Base-s-newest-B-52-squadron-to-deploy.html?nav=5010 (accessed 29 Mar 2011); Eloise Ogden, "5th Bomb Wing passes another inspection, " *Minot Daily News*, 13 November 2010, http://www.minotdailynews.com/page/content.detail/ id/549245/5th-Bomb-Wing-passes-another-inspection.html?nav=5009 (accessed 29 Mar 2011).

[70] B-52 crew member assigned to Minot AFB, North Dakota, to the author, e-mail, 1 November 2010.

[71] B-52 crew member assigned to Minot AFB, North Dakota, interview by the author, 9 May 2011.

[72] B-52 crew member assigned to Minot AFB, North Dakota, interview by the author, 9 May 2011.

the bombers arrive in theater and then quickly complete counter sea certification, or to allow aerial mining training to take place in simulators, or to establish some sanctuary of time prior to an AEF deployment to allow the crew members to attain certification in CFACC required mission skill-sets. Instead, a handful of iron majors writing DOC statements and crafting new command training guidance are left having to sort out priority missions for B-52 bombers amongst competing requirements, like the Guam deployment, and ensuring nuclear readiness for the Minot AFB airmen. Unfortunately, the diversion of focus does not end for the hard working airmen at Minot AFB when they return from Guam.

Within a period of 45 days, airmen from Minot AFB return from a 5-month deployment to Guam, participate in a two-week long USSTRATCOM nuclear generation exercise, and then complete Phase II of a conventional ORI.[73] The purpose of this third inspection for dual-role bombers, an ORI, is to "evaluate and measure the ability of units to perform their wartime, contingency, or force sustainment missions [where a phase II specifically] evaluates the unit's ability to meet wartime/contingency taskings through the [Major Graded Areas] MGAs of Employing the Force, Sustaining the Force, and Ability to Survive and Operate (ATSO)" which are very similar to what the wing had just done while on Guam.[74] Much like the NORI, the ORI also uses scenarios based on DOC, RAP, Operational Plans, and Air Tasking Orders.[75] In reducing the problem a little, it would appear that items that are unique to an ORI, when compared to a NORI, are the type of weapons used, and the ATSO procedures, which typically involve having to function throughout a chemical attack on an airfield. Is there some way to work

[73] "Minot AFB airmen to return from Guam," *Minot Daily News*, 3 April 2011, http://www.minotdailynews .com/page/content.detail/id/553375/Minot-AFB-airmen-to-return-from-Guam.html?nav=5010 (accessed 1 May 2011); AFGSC Inspector General Planning Schedule, 29 April 2011.
[74] AFI 90-201, *Inspector General Activities*, 37.
[75] AFI 90-201, *Inspector General Activities*, 40.

through three different inspections to ensure the dual-role bombers under AFGSC can perform their wartime mission?

Major General Raaberg suggests "We can use tactical conventional skills in the nuclear mission while respecting nuclear procedures."[76] His point is that there is transfer value between releasing a nuclear weapon and releasing a conventional weapon which is a worthwhile suggestion. The only problem is that maintaining nuclear procedures requires a significant level of expert personnel to maintain rigid nuclear standards, such as removing excess grease from a hydraulic line on a forklift, replacing rusted screws on a bench stand holding maintenance tools, and ensuring there is accurate reliability data being passed from a competent medical authority to commanders in charge of nuclear units. Most people would consider issues of this nature to be quite trivial. But this is not the case when the people and equipment must operate in pristine fashion before coming into contact with nuclear weapons, or other nuclear-related material.

Two problems emerge as leaders attempt to balance competing priorities. There is a need for experienced aviators that can swiftly transition from one skill-set to the next, and there is also a need for a fully resourced nuclear enterprise to devote the time necessary to implementing and enforcing strict nuclear procedures. For certain mission skills, there is direct transfer value between the nuclear and conventional missions, such as aerial refueling, navigation, time control, generating an appropriate number of aircraft, command and control processes, and a myriad of program and sustainment tasks to accomplish the mission. At the same time, there are distinct differences. For the nuclear mission, there are strict nuclear procedures, a unique command and control messaging process, and unique, although fewer, types of weapons. For the conventional mission, there are significantly

[76] Maj Gen Douglas L. Raaberg, interview by the author, 2 May 2011.

more weapons being employed, dynamic employment scenarios, and a very unique ATSO schema based on defending a base from chemical weapon attacks. There are a handful of globally dispersed bases that dual-role bombers might use in conducting their global strike mission, and some of these bases might be susceptible to chemical weapons attacks. AFGSC is responsible for ensuring its bomber wings are ready for both types of inspections.

"AFGSC develops and provides safe, secure, and effective combat-ready forces to conduct deterrence and global strike operations in support of the President of the United States and Combatant Commanders."[77] The mission of global strike has a single focus, whether that is through the use of nuclear or conventional weapons. Within the next five years, this distinction may become more pronounced as the new Strategic Arms Reduction Treaty (START) is enforced.

**Nuclear Policy**

The new START does not constitute US policy governing the role of nuclear weapons. However, it does affect force structure size based on how the USAF chooses to provide nuclear options in the form of Intercontinental Ballistic Missiles (ICBM) and nuclear bombers. Any force structure changes are self-imposed and initial indications are that the Secretary of Defense, in consultation with the Joint Chiefs of Staff, supports the president's desire for a smaller nuclear bomber force.[78]

On 5 February 2011, the new START "entered into force" thus starting the seven year time limit to comply with all treaty limitations which include reducing the number of "deployed" ballistic missiles and

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[77]Gen Phillip M. Breedlove, Vice Chief of Staff, USAF, *Air Force Mission Directive 63 by order of the Secretary of the Air Force on Air Force Global Strike Command mission, command structure, and responsibilities*, 13 April 2011.

[78] Office of the Press Secretary, "Statement by the Press Secretary on the Submission of the New START treaty to the Senate," 13 May 2010, Fact Sheet on the 1251 report, http://www.whitehouse.gov/sites/default/files/New%20START%20section%201251%20fact%20sheet.pdf (accessed 1 May 2011).

heavy bombers to a total of 700.[79] In expectation of the provisions of the treaty, the Secretary of Defense "established a baseline nuclear force structure" to comply with treaty limitations while supporting US security requirements by reducing the number of Submarine-Launched Ballistic Missiles to 240, reducing the number of ICBMs from 450 to 420, and reducing the number of deployable bombers from 94 to 60.[80] Unfortunately, these numbers exceed the 700 START limit. Given the likelihood the USAF will maintain all 20 B-2s as dual-capable aircraft, given their cost and stealth capabilities, and thus in a deployed category for treaty purposes, that leaves 40 potential deployed B-52s, or fewer, depending on further ICBM reductions. AFGSC presently has 60 bombers assigned under its command, making the START reductions a little less complicated.[81]

Bombers may be excluded from the provisions of the treaty, if they convert to a non-nuclear, or conventional, status.[82] Because B-52 nuclear and conventional weapons are very similar in terms of design and release mechanisms, altering the plane's ability to carry nuclear weapons might affect its ability to carry conventional weapons. However, there are measures available to retain conventional functionality while

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[79] Office of the Spokesman for the Secretary of State, "New START Treaty Entry Into Force," 5 February 2011, http://www.state.gov/r/pa/prs/ps/2011/02/156037.htm (accessed 1 May 2011).

[80] Office of the Press Secretary, "Statement by the Press Secretary on the Submission of the New START treaty to the Senate," 13 May 2010, Fact Sheet on the 1251 report, http://www.whitehouse.gov/sites/default/files/New%20START%20section%201251%20fact%20sheet.pdf (accessed 1 May 2011).

[81] Lt Gen James M. Kowalski, Commander AFGSC, "Status of Air Force Nuclear and Strategic Systems," Testimony to the Senate Armed Services Committee, Strategic Forces Subcommittee, United States Senate, 6 April 2011, http://www.airforce-magazine.com/SiteCollectionDocuments/Testimony/2011/April%202011/040611kowalski.pdf (accessed 1 May 2011).

[82] Treaty Between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms, 8 April 2010, Article III 7(c); Protocol to the Treaty Between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms, 8 April 2010, Part Three, section V (3& 4).

meeting the provisions of the START.[83] In effect, the new START is a mechanism for adjusting force structure to match with policy guidance but does not specify platform reductions, since presidential and Defense Department policy guidance establishes priorities.

The current US nuclear policy is found in the Nuclear Posture Review (NPR) and clarifies the role of nuclear weapons in the US national security strategy. "The President expressed his determination to take concrete steps toward [seeking the peace and security of a world without nuclear weapons], by *reducing the number of nuclear weapons and their role in U.S. national security strategy*. At the same time, he pledged that as long as nuclear weapons exist, *the United States will maintain a safe, secure, and effective arsenal*, both to deter potential adversaries and to assure U.S. allies and other security partners that they can count on America's security commitments."[84]

The stated nuclear policy then is to deter adversaries and assure allies with a smaller nuclear force. Thus, the United States desires a minimum deterrence strategy. The role of nuclear bombers is to "signal" and "hedge."[85] Bombers can signal national intent by increasing posture levels through a nuclear generation, they can forward deploy, or they can fly near a country where the United States hopes to impart a political effect. Bombers serve as an excellent "technical hedge" in their ability to rapidly generate and have nuclear weapons loaded to account for the possible loss of another leg of the US nuclear triad.[86] But given that the US policy is one of minimum deterrence, how many bombers are necessary? The stipulation that bombers serve as a hedge prevents

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[83]Raymond E. Turek, 2d Bomb Wing Treaty Compliance Officer, Barksdale AFB, LA, to the author, e-mail, 24 March 2011.
[84] Department of Defense, *Nuclear Posture Review Report*, (April 2010), iii, http://www.defense.gov/npr/docs/2010%20nuclear%20posture%20review%20report.pdf.
[85] Department of Defense, *Nuclear Posture Review Report*, 22.
[86] Department of Defense, *Nuclear Posture Review Report*, 22.

decreasing the size of the bomber force since the bomber serves in a risk mitigation role.

It is quite impossible to determine the minimum number of bombers necessary to achieve deterrence without understanding the desired effect of the nuclear force. If the desired effect is purely signaling, no more than one bomber is necessary. If the desired effect is absolute minimum deterrence, then only two are necessary. Two means having "one that an adversary might be able to take out with a first strike and one that it knows it cannot" by preserving a survivable second-strike capability.[87] However, having such a small number limits options for political leaders.[88] Because bombers were removed from nuclear alert in 1991, they no longer serve the role of a surprise first-strike option.[89] Moreover, the NPR clearly states that a requirement of the nuclear force is "assured second-strike."[90] The desired minimum number is more than two and increasing the number adds options under two prevailing second-strike nuclear strategies.

A smaller nuclear force implies a countervalue strategy while a larger nuclear force implies a counterforce strategy. A countervalue use of nuclear weapons entails "the rapid and thorough destruction of cities with massive destruction of life."[91] A counterforce use of nuclear weapons entails attacks on an adversary's means of employing nuclear weapons. The US should remain vague on the desired strategy because

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[87] James W. Forsyth Jr., Col B. Chance Saltzman, and Gary Schaub Jr., "Minimum Deterrence and its Critics," *Strategic Studies Quarterly* Volume 4, no. 4, (Winter 2010), 6, http://www.au.af.mil/au/ssq/ 2010/winter/forsythsaltzmanschaub.pdf.
[88] Stephen E. Wright, "Minimum Deterrence: Additional Considerations for Policymakers," *The Wright Stuff* Volume 6, Issue 5, (3 March 2011), 1, http://www.au.af.mil/au/aunews/archive/2011/0605/0605Articles/WilburWright0605.pdf.
[89] Department of Defense, *Nuclear Posture Review Report*, 21.
[90] Department of Defense, *Nuclear Posture Review Report*, 20.
[91] Hans M. Kristensen, Robert S. Norris, and Ivan Oelrich, *From Counterforce to Minimal Deterrence: A New Nuclear Policy on the Path Toward Eliminating Nuclear Weapons*, Federation of American Scientists (Washington, DC: Federation of American Scientists & The Natural Resources Defense Council, April 2009), 23, http://www.fas.org/programs/ssp/nukes/doctrine/targeting.pdf.

a potential adversary might build a defense against a known US nuclear strategy. A logical countervalue target might be a major population center, possibly a state capital, which limits costs associated with a defensive system since the defender only has to provide some sort of missile shield over the most important population centers. Defending against a counterforce strategy can become cost-prohibitive since nuclear forces are typically distributed to ensure survivability. Mobile nuclear forces naturally favor the defender. However, distributed fixed nuclear forces can elevate the cost of a defensive shield that must defend a larger territory. Any attempts to further distinguish a nuclear strategy are simply perverse variants of countervalue and counterforce. Therefore, the optimum minimum number of nuclear weapons should exceed the maximum number to enforce a countervalue strategy in order to provide options for decision makers in a future and uncertain environment.

The future is uncertain and the USAF must remain flexible in dealing with complexity and resource limitation. The CSAF recently addressed this issue saying "budget pressures … will compel us to be more innovative, creative, and efficient … to manage risk, and assure maximum return from our investments … [we must] distinguish between capabilities that are actually required versus those that are merely desired."[92] All signs point to a smaller nuclear force and new precision weapons provide an alternative means of protecting and defending US interests before resorting to the awesome power of a nuclear weapon. However, in order to provide a credible nuclear deterrent, through bombers in particular, the USAF and stewards of the nuclear mission must ensure the funding and support of the minimum required capabilities is available while shedding those requirements that are merely desires.

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[92] Gen Norton A. Schwartz, "A Strategy Toward Full-Spectrum Capabilities" (address, Defense Program Conference, Arlington, VA, 2 March 2011), http://www.af.mil/shared/media/document/AFD-110302-044.pdf.

**Summary**

In the decade after the Persian Gulf War, the B-52 underwent a revolution in technological capability making it an even more lethal platform. In the process, a vital and priority mission was neglected to the point that nuclear expertise and resourcing eroded below functioning levels. The USAF desire is to improve stewardship and accountability in the nuclear enterprise but it assures a certain *fait accompli* by neglecting the vital resources that enable the nuclear bomber force to function.

Multi-mission airframes do not have the luxury of allowing proven combat capability readiness levels to decrease, because they have a host of competing requirements to fulfill. When these platforms experience resource limitations, they must then prioritize which missions are more important in allocating dwindling training resources to ensure they achieve the appropriate level of readiness in each mission set. For nuclear capable bombers, the number one mission is always the nuclear mission. There are two resource problems for the nuclear mission. On the administrative and management side, nuclear units require full resourcing to perform the detailed and precise nuclear procedures associated with sustaining stewardship of the nuclear enterprise. On the operational side, nuclear units require just enough nuclear qualified aircrew to meet the requirements of the nuclear mission.

Inspections attempt to verify that a nuclear unit or wing is handling both the management of the nuclear mission, and its ability to execute the mission. The NSI and NORI which should inspect different aspects of the nuclear mission actually inspect across similar functions. One of the problems associated with an NSI is that it is very similar to a NORI, except that it is smaller in scale and inspects events out of sequence.[93] Because the events occur out of sequence, the inspection process disrupts a normal flow of events that usually occurs in the mass

[93] 5 BW crew member, interview by the author, 9 May 2011.

generation associated with a NORI, which then causes problems for the units where a single inspection item is performed multiple times out of the expected context and introduces opportunities for mistakes. The NORI is supposed to inspect a unit demonstration of operational capability in the nuclear mission, but does not actually inspect aircraft operations once they become airborne following a nuclear generation. This perhaps explains the statement made by an experienced B-52 aircraft commander that "The nuclear mission is all about procedures; the conventional mission is about operational results."[94]

One other factor that explains the recent emphasis on nuclear inspections, to the detriment of operational flying, is that wing commanders direct their people to train to either how they will immediately be used in combat, or how they will be inspected. "What senior leaders pay attention to, measure, control, and reward will have far greater impact on the culture [and training priorities] than what they say."[95] Seniors leaders use inspections as a measure of nuclear readiness, yet the inspections do not portray actual readiness, merely a subset. Since senior leaders control the budget, the number of bombers dedicated to the nuclear mission, and assignments of personnel, the bomber wings receive mixed signals when crew chief manning, an essential group of airmen for the nuclear mission, falls way below world-wide crew chief levels. The crew chiefs that have been assigned to correct the situation place an additional training burden on the wing, since they have very little bomber and nuclear experience. Because of the cuts to manning and flying hours, the bomber wings are currently in

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[94] Gen Larry D. Welch, USAF (ret), *Defense Science Board Task Force on Nuclear Weapons Surety, Report on the Unauthorized Movement of Nuclear Weapons* (Washington, DC: Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, April 2008), 12.

[95] James R. Schlesinger, *Secretary of Defense Task Force on DoD Nuclear Weapons Management Phase I report: The Air Force's Nuclear Mission* (Arlington, VA: Secretary of Defense Task Force on DoD Nuclear Weapons Management, September 2008), 32.

a state of recovery that takes time to repair. Unfortunately, the demands on those wings have not decreased.

It might be possible to adjust what senior leaders measure by finding new inspection criteria that actually measure operational capability. There is already significant overlap between nuclear and conventional skills-sets; however, a nuclear generation does not transcend the two missions due to the rigorous nuclear procedures. Focusing on areas other than a nuclear generation is also supportable within the confines of new policy guidance, since the Nuclear Posture Review states the need for a smaller nuclear force where bombers are used for signaling and hedging in order to be effective. A nuclear generation does not effectively signal intent to enemies if it is not supported by some form of strategic communication which acknowledges the performance of nuclear bombers.

It became evident after August 2007 that commanders had not balanced between the nuclear and conventional missions. The demands of combat in Afghanistan, and later in Iraq, required a crew force that was trained to employ new technological weapons in dynamic situations. In order to account for these demands, new weapons were added to the B-52 FTU syllabus to add new core capabilities to the B-52. Perhaps, unknowingly, the B-52 force still had resident expertise in the nuclear mission from those that previously performed nuclear alert as their way of life under SAC. Personnel reductions and retirements caused the expertise and resource base to erode. Solving the current problem facing the bomber force entails rebuilding experience whether that takes one or 16 years. Given that resource limitations will persist for the immediate future, the USAF, USSTRATCOM, and AFGSC need to adopt innovative approaches to be efficient in identifying and resourcing required, versus desired, mission capabilities.

# Chapter 4

## Analysis and Recommendations

Since 1965, leaders in the B-52 community balanced competing requirements while still accomplishing the assigned missions with varying degrees of success. While the context since 1965 has changed, some of the techniques and options available to commanders in the past are still applicable for today's leaders. This chapter will cover how leaders can improve readiness while also proposing several options for how to organize the force and modify training processes to apply limited resources to competing requirements. One key difference between the Strategic Air Command (SAC) era and the present era is that previous B-52 leaders had virtually unlimited access to resources when SAC dominated the USAF. That condition no longer exists today, nor is there an expectation that the USAF will return to the days of plenty. This anticipated environment will demand efficiency on the part of USAF leadership. Finally, depending on how USAF senior leaders choose to organize the force, there are subsequent suggestions for balancing competing requirements.

### Creative Efficiency

Bomber personnel can more efficiently use precious airborne training by identifying and minimizing mission complexity and then conduct non-complex training in simulators. The three mission prioritization studies examined in Chapter 3 help reveal complex conventional tasks. These complex tasks include, but are not limited to, dynamic targeting scenarios, integration with other joint actors, targeting pod training, and developing procedures to learn how to mission plan for the next generation of standoff weapons. Mission complexity in dynamic situations revolves around crews thinking critically in order to create the optimum weapon-to-target combination. When a crew is exposed to a

new weapon or targeting capability, it is essential that they experience how the aircraft reacts and displays information.

A simulator is insufficient for training in some tasks, due to its inability to replicate actual flight characteristics. For pilots, this includes takeoff and landing, aerial refueling, and formation flight. For radar navigators, simulators are currently unable to accurately represent radar returns from terrain which the radar navigators use to improve navigation system accuracy and to aim when performing a gravity weapon release. For electronic warfare officers, simulators do not accurately represent enemy threat signals because there is no ability to degrade signal strength which occurs from atmospheric anomalies, and the threat does not react to electronic warfare officer offensive and defensive actions. New B-52 aviators must learn to distinguish between the characteristics of in-flight and simulator training. Therefore, initial qualification and mission qualification training should occur in-flight. Once the crew understands how the aircraft performs, simulators can be used for continuation training, because the crew can distinguish simulator peculiarities.

Crews should practice dynamic targeting in simulators to help build critical thinking skills and then transition to in-flight training to expose crews to other targeting authority processes. The simulator is useful for practicing how the aircrew will process targets, assign weapons, and prosecute an attack, while allowing pauses for discussion, or to correct procedural errors. Another aircrew member or simulator operator can introduce the crew to joint terminology before taking the training airborne.

To avoid building inflexible habits from repeated exposure to one method, squadron leadership should direct schedulers to coordinate training with Joint Terminal Attack Controllers, Forward Air Controllers, Air Operations Center Combat Operations Divisions, and the E-8 Joint Surveillance Target Attack Radar System. The optimum use of flight

training would include live weapon releases in which an outside controlling party assigns targets as the bomber navigates through heavily defended airspace. Because simulators do not accurately replicate enemy radar indications, flying training should be optimized to use live threat replicators and to defend against airborne threats. All of this is not feasible if the simulators cannot accommodate the training.

Recent changes to B-52 simulators have added a high level of functionality to B-52 training, but additional work is required. In July 2011, one simulator at Barksdale AFB will be able to accommodate the training envisioned where the simulator can accurately replicate the employment of virtually every weapon capability.[1] Additionally, the simulator will be able to link with other platform simulators to execute Distributed Mission Operations, which will enhance the crew's ability to integrate with joint actors visually, geographically, and via radio communications. For targeting pod training, the simulator will present a realistic view of the ground environment with moving individuals and vehicles to mimic a realistic targeting environment. A second simulator at Barksdale AFB is forecast to undergo a similar modification by 2013, but this project has not yet been funded.[2] Minot AFB presently lacks any additional capability in its sole simulator. With a second operational squadron assigned to Minot AFB, construction of second simulator is a sound, and recommended, decision.

Presently, Barksdale AFB simulators are utilized at an average of 75 percent of contracted hours for a 12-hour, or even a 16-hour, day, which is an improvement since 2005 when the average simulator utilization rate for the two simulators was 48.7 and 79 percent.[3] In 1981 when Castle AFB was facing limited flying hours and reduced sortie

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[1] Maj Thomas A. Stayer, Air Force Global Strike Command, Barksdale AFB, LA, to the author, e-mail, 6 May 2011.
[2] Stayer, to the author, e-mail, 6 May 2011.
[3] Rick H. Massey, 2d Operations Support Squadron, Barksdale AFB, LA, to the author, e-mail, 18 April 2011; 2d Bomb Wing History, Jan – Dec 2005, Call # K-WG-2-HI V.1, IRIS # 1162090, (Maxwell AFB, AL: USAF Collection, AFHRA, 2009), 41-42.

generation capability, Castle's leaders increased simulator usage to 91.5 percent. To make this training useful for 2011 and beyond, Air Force Global Strike Command (AFGSC) should consider awarding Ready Aircrew Program (RAP) sortie credit for nuclear, standoff attack, and counter sea missions for experienced aircrew when conducted in the simulator. The wings must also consider increasing the security classification level in the simulators to allow full nuclear training to include the use of Emergency Action Messages (EAM).

Flying training for a simulated nuclear weapons release is not complicated, but the element of complexity in command and control procedures requires simplification. Previous SAC-era B-52 aircrew members have attested to the simplicity of decoding EAMs, and this is most likely due to two factors—frequency and simplicity.

SAC crews performed nuclear alert nearly 17 times per year where they reviewed and trained nuclear procedures. Additionally, those crews had to attend monthly Emergency Action Procedures (EAP) training just like B-52 crews do in 2011. B-52 crews do not always receive the required 12 EAP training opportunities per year, because deployment schedules reduce the number of available opportunities.[4] However, participating in nuclear exercises and nuclear inspection preparation can increase training opportunities.

There are several options for increasing the amount of EAP training—increase the frequency of training, practice EAP while airborne, and practice EAP in a degraded environment. The first, and easiest, option to implement is doubling the annual training requirement, so that

[4] Capt Matthew R. Chamberlain, 2d Bomb Wing Command Post, Barksdale AFB, LA, to the author, e-mail, 11 April 2011. According to AFGSC Instruction 10-450 Volume 6 page 8, "Recurring EAP Training (RET) is required once every calendar month. It will consist of supervised classroom training and a RET test." Additional Nuclear Control Operational Procedures (NCOP) training is provided to "8-12 crews" over two to three days in preparation for an exercise or inspection. Training consists of Positive Control Material handling and knowledge, five scenario-based EAMs, and monthly Job Performance Requirements in accordance with an Annual Training Plan.

crews attend two training sessions per month in order to approach the frequency level of SAC-era nuclear alert crews. A second option is to practice EAP in-flight on nearly every sortie. Already, efforts are underway at AFGSC to have US Strategic Command (USSTRATCOM) "broadcast exercise EAMs at various times during the month for airborne crews to copy and practice processing."[5] These efforts require further support from the nuclear wings to request EAM activity, and then from USSTRATCOM to ensure EAMs are broadcast during scheduled flying periods. The third option, to help crews understand their limitations and the importance of being intimately familiar with EAP, includes degrading transmissions to replicate a potential hostile environment.[6] Increasing frequency of exposure is perhaps more cost-effective than the next recommendation regarding simplicity.

Multiple SAC-era B-52 crewmembers affirmed that EAM processing was much easier under SAC. During that time, each SAC wing was assigned a relatively small number of nuclear missions which changed infrequently. The B-52 force is now considerably smaller, and threats to US security are more diverse, versus a single dominant threat from the Cold War-era. Therefore, crews must be adaptive in handling a multitude of nuclear missions while appreciating the amount of flexibility required of the command and control process to provide options for the president. Since 2001, the number of options available to the president has increased while "aviator involvement in designing the nuclear command and control process has been a sine-wave type event."[7] The lack of consistent bomber aviator involvement at several USSTRATCOM positions since 2001 allowed the nuclear command and control (NC2) process to "atrophy into unclear and vague guidance [since] the expertise

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[5] Col William M. Weaver, Deputy Chief, Nuclear Operations Division, J38 USSTRATCOM, Offutt AFB, NE, to the author, e-mail, 2 May 2011.
[6] Col Brett W. Knaub, (Air Forces Strategic, USSTRATCOM, Offutt AFB, NE), interview by the author, 21 April 2011.
[7] Weaver, to the author, e-mail, 2 May 2011.

was missing and thus the attention, care, and feeding [did not routinely occur]."[8]

The result of this atrophy is evident when Inspector General (IG) teams exploit ambiguities in NC2 by designing inspection exams around these complex situations. Prior to 2008, the missing expertise and manpower at USSTRATCOM precluded reviewing IG tests before the inspections. After July 2008, the tests were reviewed and corrected by USSTRATCOM, resulting in more realistic and credible testing of NC2. The truth was that even the IG teams did not have the full NC2 picture and created some ambiguous scenarios. One instance led to an immediate change to the procedures only days before a no-notice inspection.[9] The inspection was cancelled by the IG to allow for the change to be implemented and the crew force to be trained. Another instance was a question that was based on faulty information, so the IG discarded the question.[10] It has become a cooperative team effort by both USSTRATCOM and the IG teams. Fortunately, the Nuclear Operations Division at USSTRATCOM started working with all IG staffs to perform a quality control on administered exams by "requiring them [IG teams] to send [USSTRATCOM] their tests 10 days before the inspection."[11]

USSTRATCOM implemented an additional measure by helping the trainers through an established Task Force that is postured to receive questions from the nuclear-tasked wings, provide an answer for STRATCOM to approve, and then send back to the wings.[12] One other valuable action for USSTRATCOM and its nuclear wings to consider is reinstating "Strat View" trips, where bomber crews periodically fly to

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[8] Weaver, to the author, e-mail, 2 May 2011. Colonel Weaver's position was vacant for more than a year by the time he arrived and another key bomber billet "sat empty about the same time."
[9] Weaver, to the author, e-mail, 13 May 2011.
[10] Weaver, to the author, e-mail, 13 May 2011.
[11] Weaver, to the author, e-mail, 2 May 2011.
[12] Weaver, to the author, e-mail, 2 May 2011.

USSTRATCOM and spend a day touring the command and control complex, viewing current operations to gain a sense of how the whole system functions.[13] This seems to be a simple solution to the problem accurately posed by another B-52 aviator. "We know how to execute the OPLAN we are assigned to, whether conventional or nuclear, but we don't know how we fit in context of the larger war. It is easier to see in the conventional fight, but almost no exposure to the nuclear fight."[14]

Understanding how the entire system functions would help increase expertise, focus, stewardship, and morale. The planners at the operational wings can enhance the visit by providing the crews an overview before visiting USSTRATCOM. USSTRATCOM presently hosts Weapons School students from the missile, bomber, and reconnaissance squadrons.[15] One other area for STRATCOM to assist as the new Combatant Commander and Force Provider over nuclear bombers is through schedule de-confliction.

The Combat Air Force Scheduling Integrated Product Team Consolidated Planning Order (CAF SIPT CPO) is a standard USAF scheduling tool used to assign missions, deployments, and exercises. This system is a useful model for de-conflicting operational events, but it neglects other national level consequence management exercises and functional community inspections. For example, during Minot's limited preparation time for their Conventional Operational Readiness Inspection (CORI) following their return from Guam, a Logistics Compliance Assessment occurred during a CORI preparation week, causing the wing to lose six training sorties, or nearly 25 percent of flying training in one week.[16]

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[13] Knaub, interview by the author, 21 April 2011.
[14] Lt Col Eric J. Sikes, J-36 Executive Assistant, Joint Staff, Pentagon, to the author, e-mail, 1 March 2011.
[15] Weaver, to the author, e-mail, 13 May 2011.
[16] Air Force Global Strike Command, Inspector General Planning Schedule, 29 April 2011; B-52 crew member assigned to Minot AFB, North Dakota, interview by the author, 9 May 2011.

On 13 December 2009, Barksdale AFB completed their CORI before their holiday break from Christmas through the New Year.[17] On 6 January 2010, the wing received a no-notice Nuclear Surety Inspection (NSI) after completing one Limited NSI in 2009 and two NSIs in 2008.[18] The wing would go on to complete one more NSI in 2010 along with a Nuclear Operational Readiness Inspection (NORI), which the wing had not previously performed since 2003.[19] Within a period of 30 months, Barksdale AFB had five NSIs, which are supposed to occur once every 18 months. During the same period, the wing had almost seven years between NORIs, which are supposed to occur every 36 months. In 2009, the wing also completed its first Operational Readiness Inspection (ORI) in nearly a decade.[20] The demands of combat after 2001, routine deployments to Guam since 2003, and degradations to maintenance manning levels delayed Barksdale's ability to complete the NORI and ORI within the prescribed time limits. However, the five Barksdale NSIs within 30 months, and six Minot NSIs within 24 months is beyond explanation except to demonstrate the credibility of the nuclear enterprise.[21] There must be a better way to schedule and de-conflict these significant wing events to provide senior USAF and DOD leaders an accurate assessment of nuclear operational capability, without destroying the vital training opportunities to maintain combat mission readiness for potential real-world operations. It is important to acknowledge that for every known inspection, the wings also add

[17] Air Force Global Strike Command, Inspector General Planning Schedule, 29 April 2011
[18] Air Force Global Strike Command, Inspector General Planning Schedule, 29 April 2011; recollection of the author while assigned to the Barksdale AFB from June 2000 to June 2009.
[19] Air Force Global Strike Command, Inspector General Planning Schedule, 29 April 2011; recollection of the author while assigned to the Barksdale AFB from June 2000 to June 2009.
[20] Air Force Global Strike Command, Inspector General Planning Schedule, 29 April 2011
[21] Air Force Global Strike Command, Inspector General Planning Schedule, 29 April 2011; recollection of the author while assigned to the Barksdale AFB from June 2000 to June 2009.

multiple week-long exercises, where little flying occurs, in order to prepare for the inspection and to demonstrate mastery of both nuclear and conventional missions.

The USAF is currently struggling to manage the multitude of inspection requirements for nuclear bomber wings. On 3 March 2011, the CSAF sent a memo advocating the use of Major Command (MAJCOM) and USAF IG "gatekeepers [to] approve or disapprove, schedule, de-conflict, and eliminate duplication between all inspection-type activities, on behalf of the commander" to ensure independent and efficient inspections. [22] AFGSC is considering "limiting each wing to one major event per quarter."[23] The USAF IG is examining possible changes to assessment processes to find more efficient ways of inspecting USAF units although "at this time, there is no expectation that NORIs and NSIs will be combined."[24] These separate efforts are noteworthy but no integrated system exists to provide a holistic view of the 65 possible external inspection requirements levied on nuclear wings.[25] The CAF SIPT CPO is a useful model and USAF leaders should expand this system to create one central location above the MAJCOM level to allow multiple users, with unique assessment requirements, to gain an overview of when wings are available for inspections.

Presently, the MAJCOM gatekeepers are the single point of contact for scheduling nuclear wing inspections, but even these personnel are unable to create a schedule beyond nine months.[26] Under the AEF construct, units should be afforded two to three months of pre-

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[22] Gen Norton A. Schwartz, CSAF to all MAJCOM, FOA and DRU/CCs, memorandum, 3 March 2011.
[23] David L. Poole, Jr., Analyst, Inspection Plans and Programs Division, AFGSC, Barksdale AFB, LA, to the author, e-mail, 5 May 2011.
[24] Col Dewey G. Little, Air Force Global Strike Command Inspector General Office, Barksdale AFB, LA, to the author, e-mail, 16 May 2011.
[25] Little, to the author, e-mail, 16 May 2011. AFGSC validated and justified USAF and functional inspections in September 2010 and identified 94 different inspections and justified 65.
[26] Poole, to the author, e-mail, 5 May 2011.

deployment preparation focusing on the expected Area of Operations (AOR) and then be provided a 3-month reconstitution period for recovery free of inspections unless they contribute to the expected AOR mission.[27] At Minot AFB, North Dakota in 2010 and 2011, the provisions of AFI 10-401were not followed. Instead of focusing on pre-deployment preparation, the Minot units actually looked forward to utilizing their training opportunities on Guam as a way to build mission expertise since "Guam is a great place to prepare for a wartime mission."[28]

During the Vietnam conflict timeframe, and during the Persian Gulf War, there was an abundance of B-52 wings from which to pull forces. In 2011, there are only three bomber wings under the administrative control of AFGSC, so the resourcing problem has become more acute. Recently, USSTRATCOM acquired the role of Combatant Commander and Force Provider of B-52 and B-2 bombers with the dissolution of US Joint Forces Command. As the Force Provider and responsible agent for bomber requirements, USSTRATCOM is accountable for bomber readiness and should therefore be the agent utilizing a new and holistic scheduling tool to set expectations for future bomber deployments, inspections, and major exercises. Based on previously observed actions over bomber management, it appears that USAF senior leaders do not view the continuous Pacific presence deployments to Guam as an AEF task and therefore lie outside the responsibilities listed in AFI 10-401. At a minimum, USSTRATCOM, in partnership with underlying MAJCOMs and Wings, should separate major deployments, inspections, and exercises by a minimum of 30 days, to allow sufficient time for dual-role bombers to switch focus between each mission. Based on a 2005 study on aircrew satisfaction and scheduling, aircrew members are likely to achieve an acceptable state of

[27] Air Force Instruction (AFI) 10-401, *Air Force Operations Planning and Execution*, 21 July 2010, 29.
[28] Senior B-52 crew member assigned to Minot AFB, North Dakota, interview by the author, 9 May 2011.

morale when they know their schedule at least one month in advance, with a 3-month schedule as the ultimate goal to achieve a heightened state of morale.[29] An informal poll taken by the author amongst B-52 aviators in 2011 revealed that crewmembers think the inspection cycle drives their sense of training focus, and this had a negative influence on morale. Morale was higher when crewmembers thought Designed Operational Capability (DOC) tasks and RAP training drove the training schedule.

The previously mentioned suggestions of identifying and reducing complex training and moving non-complex training into simulators, improving EAP training in frequency and simplicity, and establishing a schedule that honors time between major events should be implemented immediately to add creative efficiencies for the resource constrained dual-role bombers. The following suggestions will outline possible force structure changes to account for flexibility, accountability, specialization, and readiness for dual-role bombers while addressing advantages and disadvantages of each situation.

**Force Structure Options**

In February 2011, Major General William A. Chambers, head of the Headquarters Air Force A10 directorate as Assistant Chief of Staff for Strategic Deterrence and Nuclear Integration spoke to the type of new thinking required within the nuclear enterprise: "The Post-Cold War era is over. We really do need to fast forward our analysis of today's environment and what it takes to produce [deterrence in the] 21st century. Numbers are extremely important, but our analysis has to have

[29] Ryan E. Gorecki, "A Satisfying Schedule for Aircrew Members," Graduate Research Paper (Flint, MI: Baker College Center for Graduate Studies, 2005), 21. The study used Pearson Correlation Coefficients, Confidence Interval Testing, and Linear Regression to suggest how far in advance crew members would like to know their schedule in order to be satisfied with their work schedule.

stability as its end. And finally in this 21st century, less isn't just less, less is different."[30]

Maj Gen Chambers is saying the nuclear enterprise needs to cast off previous conceptions of how the force was structured and postured, and instead take a "fresh look at all complementary capabilities."[31] "The emphasis on immediate operational availability as the measure of readiness is an artifact of the cold war."[32] Therefore, in consideration of doing things differently, while acknowledging a decline in the immediate need for operational forces, there are three likely force structure scenarios for nuclear capable B-52s: status quo, separate wings, and specialization below the wing level.

If USAF senior leaders want to maintain the current force structure, wherein both B-52 wings continue to provide the full spectrum of mission capabilities, then USAF senior leaders need to prioritize the requirements levied on the bomber wings and provide bomber commanders the flexibility to tailor training processes to account for existential threats to national security. At the same time, USAF senior leaders must work with other nuclear enterprise inspection agencies to ensure the inspection system supports a new reprioritized focus based at the MAJCOM and wing level. In his study on military readiness, Richard Betts made the observation that organizations must either grow the supporting overhead that accompanies new complex and specialized skills, or they must specify the desired level of readiness to account for having a smaller professional cadre that must remain highly proficient in a broad range of skills.[33]

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[30] Maj Gen William A. Chambers, "Future Challenges in Operationalizing Nuclear Deterrence" (address, 3rd Annual Nuclear Deterrence Summit, Alexandria, VA, 18 February 2011), http://www.af.mil/information/speeches/speech.asp?id=641.
[31] Chambers, "Future Challenges in Operationalizing Nuclear Deterrence."
[32] Richard K. Betts, *Military Readiness: Concepts, Choices, and Consequences* (Washington, DC: The Brookings Institute, 1995), 27.
[33] Betts, *Military Readiness*, 249.

President Obama, in consultation with his military chiefs and Secretary of Defense, created a policy on the use of nuclear forces that was directive but not informative. Given that the purpose of the policy is to reduce the role of nuclear weapons in the US National Security Strategy, the policy needs to convey a desired effect.

During the 1980s, when the Joint Strategic Target Planning Staff defined the nuclear war plan "officials came to the conclusion that the nuclear war plan drove force structure requirements [leading to] unchallenged growth in the target base and the number of weapons and delivery vehicles to cover it."[34] If civilian decision makers then approve the nuclear strategy, the military services decide how they will use service capabilities to meet the requirements.

There is a tension, however, in this process, because policy guidance is attempting to limit the force structure which affects service readiness levels, while USSTRATCOM strategy requirements levy a large training burden on the nuclear bomber wings to maintain nearly every B-52 aviator as nuclear qualified. The training burden does not come from the actual nuclear flying training, but instead, comes from having to train the large support structure that must comply with the strict nuclear procedures. More than likely, USSTRATCOM recognizes that if the time comes where nuclear forces must be employed, forces must be immediately available. This is an excellent approach. Yet, this is where B-52 aviators lack the larger view as to where they fit into the nuclear strategy.

Is there really a point in time when the entire bomber force must conduct nuclear operations? The Secretary of Defense's Nuclear Posture Review states "The threat of global nuclear war has become remote, but the risk of nuclear attack has increased" due to President Obama's

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[34] Lt Col Rita Clark, Vincent A. Giroux, Jr., and Todd White, *History of the United States Strategic Command*, Command Historian Office, 1 June 1992—1 October 2002, 13-14. http://www.stratcom.mil/files/History.pdf.

assessment of the threat from "nuclear terrorism."[35] USSTRATCOM is levying large requirements on bombers based on *remote* chances that it might be needed, or *if* a leg of the triad suffers from a technical issue, but then leaves readiness issues up to the USAF, which also has to contend with requirements from other combatant commanders that are more likely to be used.

The nuclear readiness requirement is unlike any other mission requirement, because it demands immediate availability of perfectly trained forces for a flying mission that is not very difficult to execute. Yet, other combatant commanders also have a need for bombers that requires a significant amount of training to employ the aircraft in dynamic situations, where any failure is likely to result in the loss of one's own life, or the lives of friendly forces and non-combatants. It would seem that USSTRATCOM still embraces the Cold War mentality of maintaining a large and ready force, while the USAF views the USSTRATCOM requirements as a desire versus a requirement, and thus neglects the provisions of personnel and flying training necessary to maintain both skill sets. Perhaps there is an underlying fear that if bombers lose the nuclear mission, they will evaporate in the same fashion that bomber force structure size and personnel rapidly decreased following the Persian Gulf War. Until USSTRATCOM and the USAF leaders can resolve their differences, through further reorganizations and changes in leadership, the units that withstand the worst of this turmoil need more flexibility and freedom to determine where their skills are needed most.

**Status Quo—Squadrons Maintain Nuclear and Conventional Missions**

The number one priority for nuclear capable bomber units is always meeting the demands of the nuclear mission according to Operational Plan (OPLAN) tasks written in unit DOC statements.

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[35] Department of Defense, *Nuclear Posture Review Report*, (April 2010), iv, http://www.defense.gov/npr/docs/2010%20nuclear%20posture%20review%20report.pdf.

Commanders must ensure this mission is resourced first. If USSTRATCOM reduces the requirement for nuclear qualified crews, commanders should consider assigning this mission to the instructor force first, then experienced crewmembers second, and finally resorting to inexperienced crewmembers. This would resemble the initial nuclear cadre of the special B-29 SILVERPLATE bombers, discussed in the introduction, which provided a specialized skill for a small nuclear requirement.

At the MAJCOM level, the people crafting the DOC statements should review every theater-specific OPLAN to determine the number of crews required to support each plan and then write the DOC requirement as a reflection of the types of weapons used, designating these DOCs as secondary missions. This approach will realign the DOC process with the original intent of the program, since post-Vietnam through 1988. By rewriting the DOCs in this fashion, the designers are indicating that an entire squadron of B-52 crews do not need to maintain qualification in, say, the Conventional Air Launched Cruise Missile (CALCM), when perhaps only eight or nine crews are required for the most constraining OPLAN. AFGSC is already adopting this approach by adding specificity to DOC statements and segmenting RAP qualification based on individual mission skill-sets rather than on one broad conventional qualification.

As national interest in various global regions peaks and subsides, commanders should tailor training to focus on the OPLAN of that specific region in order to ensure crews are immediately available and ready to go to war. More than likely, preparation for one region is likely to extend the benefit of preparation to other global regions, as long as crews are practicing core competencies like dynamic targeting across various weapons.

To build weapon expertise, commanders should consider aligning non-core weapon qualifications by squadron flights where one flight

might handle aerial mine delivery and another might specialize in Miniature Air Launched Decoy (MALD), or Laser-Guided Bombs and the Advanced Targeting Pod (ATP). This alignment must be supported by the RAP, so provisions should be made in the RAP to allow squadron commanders to specify which crew members are aligned with specific Combat Mission Ready categories. This of course is only a starting point for new aviators joining the unit. In adopting the approach used by the 42 BW at Loring AFB, Maine, additional weapon qualifications could be added through a graduated continuation training program where after 18 to 24 months, an individual might be qualified in every weapon type while still only being responsible for being highly proficient in a few categories. The commander might further designate crew members to obtain proficiency and familiarization in other weapons.

The value of establishing a system like this is that crew members are responsible for certain subsets of the overall mission, while the unit as a whole is able to meet the demands of the OPLAN task. The drawback becomes apparent if there is a crisis situation that requires more combat capability than is presently available. This is the dilemma that Richard Betts addresses in acknowledging the time relationship between the "need to convert potential capability into the actual capability [and the time] between the decision to convert and the onset of war."[36] In wars where the United States chooses to engage in conflict, the time disparity is usually not an issue. In both Vietnam in 1965 and the buildup to the Persian Gulf War, at least five months were available to convert potential capability into actual capability. In Operation Enduring Freedom, there was less than one month available, although the bombers performed a mission for which crews had prepared.

In the future, decision makers should carefully consider unit qualifications and readiness levels before assigning forces to crisis

[36] Betts, *Military Readiness*, 28.

situations. If the decision makers desire a certain capability, they should ask the wing commander how much time he or she needs to produce a desired capability. Or, as soon as the decision makers know they may need an emerging capability, as was the case with CALCM in the Persian Gulf War, they should immediately notify the wing to provide time for moving from a familiarization or proficient level to the highly proficient level. One factor that will force commanders to deviate from this approach at readiness is the inspection regime.

In 1987, B-52 wings had a primary nuclear mission, a secondary conventional mission, and only one inspection. In 1988, a second type of inspection, a CORI, was added, specifically for the four purely conventional tasked wings. They were all inactivated by 1994, while the CORI did not go away.[37] There are two possible conclusions to draw from this. One conclusion is that prior to the existence of the CORI, commanders were able to assess unit readiness through numerous wing and SAC exercises, or perhaps wing commanders provided assessments to high level leaders attesting to unit readiness. Perhaps this provides an avenue for today's leaders to use in assessing conventional capability. The other conclusion is that the lack of a conventionally-focused inspection prevented the bombers from fully developing conventional capabilities prior to the Persian Gulf War, since many units experimented with high-level delivery tactics just prior to the war. Those that went through this preparation, regardless of an inspection, achieved better results in the war. In 2011, there may be another inspection option.

The USAF should consider adopting a single inspection for AFGSC-assigned bombers that reoccurs every 12 or 18 months. A single inspection is not possible under the existing grading criteria that separate nuclear and conventional missions. AFGSC is charged with a

[37] Robert F. Dorr and Lindsay Peacock, *Boeing's Cold War Warrior: B-52 Stratofortress* (London, UK: Osprey Publishing, 1995), 227-229, 241, 243.

single mission, that of conducting global strike whether nuclear or conventional. Having more than two distinct inspections is likely to divide wing level focus at a time when a single mission focus is necessary. Two immediate steps to make a single inspection possible are to remove the requirement to inspect a nuclear generation and eliminate, or replace, the chemical defense portion of the inspection. A possible replacement activity that transcends both mission sets might be a degraded cyber or space environment. By demonstrating that global strike forces can operate in such an environment, the United States can likely deter this more prevalent type of harassing activity over a less likely chemical, biological, or nuclear weapons attack, which has a limited geographical effect. Furthermore, the three inspections as they now exist do not fully measure operational capability, so a new inspection is necessary.

A new Operational Readiness Inspection would measure the same areas under review in NSIs, NORIs, and CORIs, except it would also include areas measured by the previous SAC ORI, which assessed unit capability after aircraft became airborne. This might appeal to the aircraft commander that was interviewed by the Defense Science Board Task Force on Nuclear Weapons Surety who thought the nuclear mission was all about procedures rather than operational results.[38] An inspection that truly assesses operational results is more likely to motivate the force when the graded areas reflect how the aircraft might actually be used in combat, whether nuclear or conventional. A possible ORI scenario might measure a wing's ability to generate and launch a six-ship of B-52s loaded with a mix of CALCM, Joint Air-to-Surface Standoff Missile (JASSM), Miniature Air Launched Decoy (MALD), Joint Direct Attack Munition, and a targeting pod while another two aircraft

[38] Gen Larry D. Welch, USAF (ret), *Defense Science Board Task Force on Nuclear Weapons Surety, Report on the Unauthorized Movement of Nuclear Weapons* (Washington, DC: Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, April 2008), 12.

generate and launch on a nuclear strike.[39] In this process, virtually every DOC task is assessed without the unrealistic burden of generating the entire base to nuclear alert status, while still being able to assess the other processes on the base that enable those jets to conduct their mission. If a larger display of capability is still required, a wing, with sufficient advance notice, could prepare to cycle through every mission set over the course of one long inspection, or could distribute mission capabilities across the inspection cycle based on an IG-selected scenario reflecting real-world conditions.

The suggestions above do not provide a final solution but merely identify a starting point for addressing required capabilities versus something that is desired, a remote reflection of a previous era, or perhaps unrealistic. Without a proper alignment between new ways of expressing DOC tasks and the inspection cycle, this status quo arrangement will not work. In the event that USSTRATCOM and the USAF cannot agree on mission priorities for strategic bombers, there is another possibility for force structure arrangement.

**Separate Nuclear and Conventional Wings**

Having one B-52 wing devoted to the nuclear mission while another wing is devoted to the conventional mission is one way to force prioritization of mission skills to resolve the existing tension between the skill-sets. The NPR, the new Strategic Arms Reduction Treaty (START), and the present distribution of nuclear Weapon Storage Areas already favor the creation of separate wings.[40] Instead of a pure separation of

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[39] The rightful owner of this idea is Col Parker W. Northrup III.

[40] Air Force Association, "No Weapons Storage Area for Barksdale," 23 February 2011, http://www.airforce-magazine.com/DRArchive/Pages/2011/February%202011/February%2023%202011 /NoWeaponsStorageAreaforBarksdale.aspx, (accessed 23 February 2011); Department of Defense, *Nuclear Posture Review Report*, 21, 24; Treaty Between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms, 8 April 2010, Article III 7(c); Protocol to the Treaty Between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms, 8 April 2010, Part Three, section V (3& 4).

nuclear and conventional capability, the nuclear wing, for instance, the 5 BW at Minot AFB, North Dakota, would not only perform the nuclear mission, but would also carry other standoff attack roles as well by retaining qualification in CALCM, JASSM, and MALD. The 2 BW, at Barksdale AFB, Louisiana, would also maintain qualification in the non-nuclear standoff weapons as well as the remaining direct-attack conventional weapons. This arrangement would resemble General Chain's adjustments to the SAC bomber force in 1988 to account for likely future uses of bombers in a conventional role.

There are numerous complications with having separate wings, mostly pertaining to crew force management, morale, massing effects in war, and aircraft modifications. In 1974, General Dougherty found that the conventional skills of his SAC warriors perished within a couple years following the conflict in Vietnam. In order to breed mission competence, aircrew members should be assigned to a nuclear or conventional wing for a period of five years, before having an assignment in the other mission. This duration of time allows for upgrades within one mission, while building experience to make transition to the other mission less complicated. This method of assignment is basically already in place, since the USAF wanted to avoid additional permanent change of station costs associated with routine moves between like units.

Transitioning between wings will require significant time devoted to training for the new mission. Mission Qualification Training (MQT) programs may require more than the 90 days allotted for single-mission MQT and consideration should be given for adopting the 42 BW graduated MQT approach.[41] Additionally, attendance at the USAF Weapons School, Weapon Instructor Course (WIC) will require additional preparation to ensure new students have a firm grasp on both missions.

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[41] Air Force Instruction (AFI) 11-2B-52 Volume 1, *B-52 Aircrew Training*, 21 November 2006, 20; Air Force Instruction (AFI) 11-2B-52 Volume 1, *B-52 Aircrew Training*, DRAFT, paragraphs 3.3.1.2.1and 3.3.1.2.2.

The WIC has already adopted additional nuclear training syllabus events that integrate with other nuclear platforms and agencies in a limited nuclear strike integration exercise. The exercise involves WIC students from bombers, tankers and missiles, and integrates with nuclear tasking agencies from USSTRATCOM, the nuclear Task Forces, and AFGSC's Air Operations Center. One WIC instructor who has twice executed this exercise commented that "the training is better and more realistic than anything I ever saw in the wing … our WIC is now leading the CAF in nuclear training."[42] It is easy to see with this comment that aviator perception of realistic training has a positive influence on morale, which concerns some commanders when considering having separate wings.

Simply put, morale is a leadership issue, and it is important to identify what leaders can do at various levels to improve morale. In 1969, Lt Gen Paul K. Carlton could tell that morale was suffering in the 93 BW at Castle AFB, California because the instructors pushing student lines through the B-52 syllabus were unable to keep pace with the demand for qualified B-52 crewmembers to support the war in Southeast Asia and the rest of SAC's nuclear wings. The Combat Crew Training Squadron (CCTS) instructors were expending a great deal of effort when the maintenance support activity was under resourced and could not keep pace with the flying schedule. The instructors said they were overworked, indicating they could not expend any more effort to complete their mission. Yet, when SAC brought the maintenance manning levels closer to 100 percent, the CCTS was able to increase student production. The instructors were not overworked; they felt like their efforts were futile because they did not control the means to complete their mission. During the war in Vietnam, the crews were able to apply precise effects where they were needed to support the ground forces, especially at Da Nang and then at Khe Sanh during Operation Niagara, using a targeting

[42] Stayer, to the author, e-mail, 9 February 2011.

system that allowed greater success than the first B-52F mission on 18 June 1965. More importantly, the ground force commanders provided feedback to SAC attesting to the value of the B-52 mission results.

Morale improves when people have the resources to perform the job they are asked to do, and when they receive feedback on the importance of their job. Both of these factors are beyond the direct control of local squadron, group, and wing commanders. Local commanders can improve morale by fighting for and acquiring the resources needed to support accomplishing the mission, or, if resources are not available, they can attempt to remove some of the requirements to allow people to accomplish what is within their means. In 1981, when faced with resource limitations, the 93 BW commander worked with SAC to decrease training requirements—the SAC-mandated student solo flight and additional global contingency training—in order to match available resources to the required mission. At the time, the previous presidential administration budget would not support an increase in resources.

To improve performance, there are a few recommendations commanders can adopt to reinforce and motivate their airmen. The SAC standard was performance through repetition and competition. This was most evident when commanders monitored and measured bomb scores to generate competition among B-52 crews as to who was the best. Ultimately, the issue was decided at annual SAC bomb competitions, where the person delivering the best bomb had their Officer Performance Report personally endorsed by the SAC commander. Commanders recognized and rewarded the behavior and skill-sets they desired in their airmen. While spot promotions and performance report skip-echelon endorsements no longer exist, there are other means available.

Commanders established a hierarchy of crew expertise when forming crews to spur competition. As crew members became more experienced and demonstrated competency and expertise, they were given a special crew designation, which generated a sense of

accomplishment for those earning the status. This is a simple method for any commander to adopt, because it conveys what is important to the commander. This same theory holds true when commanders recognize performance through quarterly awards, apply rankings on performance reports, and when selecting airmen for positions of greater responsibility. Commanders have significant influence in shaping the type of behavior they expect of their airmen. In order to ensure airmen maintain a sense that both nuclear and conventional skills sets are important to the bomber community, MAJCOM commanders could stipulate that command of a B-52 squadron be contingent upon having an assignment in both a conventional and nuclear unit.

Maintaining morale among maintenance personnel occurs when they have a clear sense of mission focus and are offered incentives. Maintenance commanders noticed a decrease in morale during the past two years "due to the inundation of exercise after exercise [requiring an already strained workforce] to work continuous 12-hour shifts."[43] The USAF offered a reprieve to these hardworking airmen by "offering reenlistment bonuses, doubling bomber crew chief production, and moving crew chiefs from fighters to bombers."[44] These moves are a step in the right direction and the USAF should continue to "fund and man to 100 percent of the validated requirements instead of accepting risk."[45] The only minor challenge for a fully resourced maintenance group would be management of weapon loaders, because virtually every other maintenance specialty "would be used in each mission set."[46] Overall, one maintenance deputy group commander thought "daily life would be much more simple and predictable if the two wings specialized."[47] One further area that may affect the morale of both operations and

[43] Col David E. Foote, Deputy Commander, 2d Maintenance Group, Barksdale AFB, LA, to the author, e-mail, 9 May 2011.
[44] Foote, to the author, e-mail, 9 May 2011.
[45] Foote, to the author, e-mail, 9 May 2011.
[46] Foote, to the author, e-mail, 9 May 2011.
[47] Foote, to the author, e-mail, 9 May 2011.

maintenance personnel is participation in contingency and crisis operations.

For short duration conflicts, both bomber wings will be required to contribute to the war effort, as USSTRATCOM's and AFGSC's mission evolves to include complementary capabilities where previous nuclear targets can be destroyed with precise standoff weapons. The nuclear wing would be able to use the skill-set transfer from nuclear missiles to conventional missiles, with the addition of a few more mission skill-sets related to JASSM and MALD. To ensure the wing still provides a measure of nuclear deterrence, the wing could periodically generate one of two aircraft in a nuclear role to maintain aircrew and maintenance proficiency, while also sending ambiguous signals to hostile actors.

If short duration conflicts grow in scale, and to mass forces, the USAF could first rely on additional conventional platforms, like the B-1 bomber, while considering the need for more B-52s. One lesson from the Vietnam conflict and the Persian Gulf War is that units must train to how they will be used in combat; otherwise they will not achieve successful results. For a longer war, the Vietnam-era Castle AFB Remote Training Unit (RTU) and Persian Gulf era Nellis range Desert Warrior training models could be useful to convert nuclear and standoff weapon crews into conventional direct-attack crews.

Between 2011 and 2015, the B-52 will gain additional situational awareness tools that will substantially reduce the amount of time required to develop proficiency in new missions.[48] Presently, B-52 crews print charts to use in-flight, when plotting targets and threats, in dynamic targeting scenarios. Future system upgrades will automate this process and provide continuity between the aircraft's three separate cockpit areas to build a single target area presentation for every crew position to observe. The crews will finally be able to have a single shared

[48] Stayer, to the author, e-mail, 17 May 2011.

mental model for the problem facing them, without having to rely on extensive discussions while in a hostile environment. The aircraft will also have the ability to replicate some threats, using onboard systems, meaning crews can reduce sortie duration by conducting training closer to their home field, assuming the wings can sanction a portion of the airspace structure near the base. The only non-local area training will occur at ranges to release live weapons, at aerial refueling tracks, and at large force exercises with other joint actors. All B-52s, whether they serve the nuclear or conventional mission, should receive these modifications since they all contribute to mission execution success.

The RTU model will benefit from these future upgrades by teaching basic direct-attack weapon skills, new threat tactics, and expected command and control processes. The nuclear crews would rotate into the deployment process just like crews did in the latter part of the Vietnam conflict to undergo contingency training and certification by the forces already in place. The checkout could resemble a mix of the Vietnam and Diego Garcia models where crews attend a specialized ground school and then observe a veteran crew before flying a supervised sortie to gain proficiency for later mission certification by a tactical evaluation crew. In the Persian Gulf War, SAC and 8th Air Force officers determined that crews required two sorties to become comfortable with the combat environment. If the demands of the conflict require even more B-52 crews, MAJCOM commanders could petition USSTRATCOM to suspend the nuclear mission, like SAC did during the Persian Gulf War, while devoting all future training to the conventional conflict, although this should come as a last resort to preserve the vital nuclear deterrence mission.

**Separate Nuclear and Conventional Squadrons**

One last force structure option to consider is having one nuclear and one conventional squadron within each wing. This option is essentially a blend of the two previous options and is possible within the

present situation, although not optimal. Having separate squadron missions will bring focus for the aviators, but then offers no benefits for the rest of the wing. Two wings would still be required to maintain nuclear procedures and the large support requirement associated with the nuclear mission, and the units within the wing would have to contend with multiple inspections. Morale might be a more complicated matter due to deployment schedules, if one squadron was exclusively used for deployments. The wing commander might consider rotating crews from the nuclear squadron into the deployments, but this would eventually remove any distinguishing features between the two squadrons. The USAF would also have to reconsider opening another Weapon Storage Area at Barksdale AFB, since the CSAF already announced that higher priorities precluded adding a nuclear Weapon Storage Area.[49] Essentially, there are two choices for the USAF, prioritize and resource the missions for dual-role bombers, or separate the two missions such that each receives its due priority.

**Summary**

Despite the numerous reorganizations within the USAF, and changes in leadership, the tension between the two missions remains. The tension has become more acute in the last five years, because neglect of the nuclear mission finally surfaced in 2007 as the last remnants of the SAC alert force retired. After 2001, the dual-role bombers were asked to maintain 100 percent proficiency in two missions when this had never been done in the past. Under the SAC regime, units were highly qualified in conventional tasks if that was the unit's only focus. Under Air Combat Command (ACC), the bomber units progressively honed their conventional capability to the detriment of the nuclear mission. The only time in SAC history that a B-52 wing carried

[49] Air Force Association, "No Weapons Storage Area for Barksdale," 23 February 2011, http://www.airforce-magazine.com/DRArchive/Pages/2011/February%202011/February%2023%202011 /NoWeaponsStorageAreaforBarksdale.aspx, (accessed 23 February 2011);

two "primary" tasked missions was from 1988 to 1992.[50] During this time, SAC approved of the wing splitting the missions so that one squadron held the nuclear mission while the other squadron held the conventional mission. Headquarters Air Force simply questioned the arrangement but did nothing to clarify the situation. In effect, there were no problems since the wing commander provided each unit with a single mission focus.

The two predominant force structure possibilities, status quo and separate wings, have advantages and disadvantages. The status quo option can only work if the USAF provides enough resources to support USSTRATCOM's requirements. The separate-wing option minimizes the tension over resourcing the two missions because this option clearly distinguishes the priority of the nuclear mission by separating it from the conventional mission. Of course, this option also allows for some conventional tasks to remain with the nuclear wing, but this is not without sound logic since the future of USSTRATCOM's mission entails using conventional standoff capabilities. Whichever direction USAF leaders choose to pursue, they must understand that learning and performing nuclear procedures is not simple and requires the full authorization of personnel, unless the USAF is willing to accept the possibility of a further breach in the surety of its nuclear weapon stewardship. The previous breach occurred in 2007, because processes superseded procedures. This is one area for special consideration in solving the problems associated with the nuclear mission, as well as with general bomber readiness and preparation for war.

The people performing the nuclear mission succeed when they have no doubt regarding the tasks they must perform. Nuclear procedures must be written and made available to every person working

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[50] See discussion in Chapter on the 2 BW 3; Robert F. Dorr and Lindsay Peacock, *Boeing's Cold War Warrior: B-52 Stratofortress* (London, UK: Osprey Publishing, 1995), 240. The conventional 62 BS inactivated in 1992.

in that mission. These people must not rely on informal methods of passing guidance on how to do the job because the job does not demand critical thinking skill-sets, merely following procedures.

On the other hand, those performing the conventional mission are at a great disadvantage if they do not share their lessons learned. In Vietnam, as units shared lessons learned, and established a feedback system to ensure those being trained for the conflict in the Southeast Asia understood their future responsibilities, combat results improved. In the Persian Gulf War, under the SAC system that relied on written procedures, some units did not have positive combat results, because they were not aware of better methods for delivering weapons. By 2001, the B-52 crew force learned to share lessons learned, although this effort did not extend between platforms, which is evident when seeing that B-2 crews were already aware of the 90-degree impact angle when employing JDAM several years before the B-52 crews learned the tactic. Sharing lessons learned should occur in the realm of training, among different levels of staffs, and between combat units.

Two enduring lessons emerge from this research paper, albeit, they are not original in concept. First, readiness is a function of training. The present focus of training in the nuclear mission is how to perform a nuclear generation. If the nation's leaders are satisfied with this level of preparation, then the nuclear bomber force is performing its duties. If the nation's leaders are not satisfied, they should consider adjusting inspection measurement criteria to focus on the true effect they hope to achieve with nuclear capable bombers, since inspections drive training focus.

The second enduring lesson is that morale is a function of two aspects. Morale improves when people are able to perform all of their duties with 100 percent proficiency. Additionally, morale improves when people receive feedback affirming the importance of their jobs. Recently, the CSAF, the Secretary of the Air Force, and under secretaries from the

Department of Defense have visited their nuclear wings and explained the importance of the nuclear mission in an effort to re-invigorate the nuclear enterprise. In one respect, these individuals can solve the resource problem facing the bomber wings, which will allow bomber crews to perform their jobs with 100 percent proficiency. However, when performing the nuclear mission, nuclear crews work directly for the President of the United States, through USSTRATCOM and the Joint Chiefs, in conveying a desired effect. There is very little separation between policy, strategy, and tactics in the nuclear world, meaning nuclear forces serve directly at the pleasure of the president. The US President should consider providing feedback on how well his nuclear forces are executing his or her policies. National leaders from other counties that enjoy the benefits of US-extended deterrence might also consider providing feedback on how well the United States is meeting their needs. A brief example from another nuclear power is illustrative.

In 2008, France reduced the number of its nuclear aircraft squadrons from three to two, with the Mirage 2000N having the sole function of providing nuclear deterrence.[51] For the French, this job is extremely valuable since the president and other Ministry of Defense leaders affirm the important role of these squadrons in "*protecting the sovereignty of France*" (emphasis added).[52] The nuclear squadrons only focus on performing the nuclear mission. By focusing on a single mission, the Mirage 2000N crews ensure proficiency in a "permanent assignment that few will leave for other adventures."[53] At the same time, those nuclear squadron members might feel left out from participating in

[51] Lt Col Olivier Kaladjian, (*Armée de l'Air o*fficer and student at the School of Advanced Air and Space Studies, Maxwell AFB, AL), interview by the author, 28 March 2011. Lt Col Kaladjian flew the Mirage 2000 (non-nuclear variant), and flew most of his hours in the Mirage F1CR before his assignment to Air Command and Staff College, and then, his assignment to the School of Advanced Air and Space Studies. He cannot attest to the morale of the Mirage 2000N crews, but can attest to how his nation values their nuclear role.
[52] Kaladjian, interview by the author, 28 March 2011.
[53] Kaladjian, interview by the author, 28 March 2011.

other situations of national importance, such as flying with the Coalition in Afghanistan, flying air-policing sorties over Chad, or enforcing no-fly-zones over Libya.[54] Some might be willing to trade the exploits of foreign adventures and accolades for a permanent and stable job where they can see their family on a daily basis. In any event, this focus on the nuclear mission may change as multirole Rafale units will accept the nuclear mission. The French air force will also retain the capacity to deploy individual Rafale pilots and ground crew members to support deployments outside of France like the rest of the *Armée de l'Air*.[55] Perhaps the Rafale will fulfill two capabilities—providing nuclear deterrence, and maintaining the morale of those pilots who fly them. It will be interesting to see if the nuclear Rafale squadron is affected by mission creep in the coming years, if other tasks gain priority over the primary nuclear mission.



[54] Considerations posed by the author, and do not express the views of Lt Col Kaladjian.
[55] Kaladjian, interview by the author, 28 March 2011.

## Conclusion

*The issue today is not the use of strategic nuclear forces in non-nuclear contingencies. The issue is the balance and the attitude*

The Defense Science Board Permanent Task Force on Nuclear Weapons Surety, Report on the Unauthorized Movement of Nuclear Weapons, April 2008

*A key premise of the 2010 NPR was that any successful strategy for achieving these objectives must be balanced, with movement in one area enabling and reinforcing progress in other areas.*

Nuclear Posture Review Report, April 2010

*Anticipating the challenges and decisions ahead, Air Force leaders have begun a discussion on how best to balance our Force Structure, our Readiness, and our plans for Modernization at whatever level of resources we are provided. And, as General Schwartz and I have previously noted, the key term is balance.*

Michael B. Donley, Secretary of the Air Force, 16 May 2011



This purpose of this thesis was to answer two questions. First, why does it seem as if bombers have been unprepared for their mission? Second, how can the Air Force ensure dual-role bombers are prepared to handle the nuclear and conventional missions? Following the unauthorized movement of nuclear weapons aboard a B-52 in August 2007, multiple studies have suggested that the dual-role bombers need to achieve a balance between the two mission sets. Since 1965, B-52 leaders have had to confront competing requirements in achieving a balanced force. However, context affected the ways in which they achieved balance, based on the means at their disposal.

The Vietnam era represented the epitome of plentiful means, yet bomber leaders still found themselves constrained in having to support a large conventional commitment while embroiled in a Cold War with the Soviet Union. Strategic Air Command's (SAC) leaders directed their

efforts at maintaining constant readiness for the nuclear deterrence mission and utilized a just-in-time training philosophy for the conventional mission. The nuclear mission was always the number one priority, and any residual force was devoted to the war in Southeast Asia. SAC's training methods included using in-theater training, passing lessons learned between units in the theater during unit and crew rotations, and then establishing a training school dedicated to pre-deployment contingency training. The wing that was responsible for this contingency training had its own growing list of competing requirements. The solution to correcting the imbalance at the 93d Bomb Wing was having SAC provide the wing with the full complement of manning authorizations. Morale was suffering because the instructors in the wing felt overworked. They were not overworked. They were just frustrated because they could not perform their mission due to an inability to control the resources that enabled them to perform their mission.

The initial group of B-52Fs and crewmembers that deployed to Vietnam was not prepared for their mission, because they devoted very little time to training for the mission. They learned how to conduct conventional bombing operations while in combat. Eventually, they devised a successful method for employing bombers by establishing a grid-targeting scheme that was supported by an accurate off board navigation system called COMBAT SKYSPOT. During combat operations, SAC's leaders received feedback from ground commanders attesting to the effectiveness of the bombers in destroying the enemy.

Between 1965 and 1972, SAC adjusted its nuclear posture based on presidential policy that set a priority for how the bombers were needed. In this light, increasing a commitment in one area meant a sacrifice in another area. Under President Lyndon Johnson's graduated approach of increasing bombing activity, SAC was able to replace the loss of a nuclear bomber to the conventional commitment with a nuclear ballistic missile. President Richard Nixon had no other options in 1972

to bring the conflict in Vietnam to a close. He had to rely on SAC bombers to deliver a decisive blow, and his heavy use of the airplane would also later hurt bomber readiness. Presumably, SAC maintained its nuclear commitments, or at least accepted additional risk by maintaining a firm grasp on deployed bombers in the event they needed to be recalled to support the nuclear mission. This notion of an overbearing SAC was not lost on the leaders of the next big war in the Persian Gulf.

Prior to the Persian Gulf War, there was still a relatively large nuclear bomber force that slowly acquired additional conventional capabilities and requirements. However, chronic neglect of military defense spending, following the conflict in Vietnam, placed additional burdens on bomber wings. In 1981, the 93 BW found it lacked the resources to accomplish its mission. SAC allowed wing commanders to focus training priority by providing a prioritized list of training events that had to be accomplished. The wing commander was then able to assess and modify how training was accomplished in order to perform the most critical missions.

It is unfair to use a comparison of required skill-sets between generations that focuses solely on the number of weapons employed by a platform. Before the Persian Gulf War, the bomber mission was difficult due to a lack of technology. At the time, flying the aircraft in a low-level environment was extremely challenging, so that is where SAC focused its efforts in full expectation of having to fight a Soviet threat in the low-altitude regime. At the same time, this level of focus, as well as an existential Soviet threat, kept the bomber force motivated and focused on executing the mission.

In 1988, Gen John T. Chain Jr., SAC's commander, made an abrupt change to the bomber force structure. He recognized that the United States needed a powerful conventionally-focused power-projection capability, which his bombers could fulfill. As such, he designated four

bomber wings with a conventional-only mission and removed their nuclear commitment. To support that change, he devised a new inspection process that ended up being seldom used, because bomber conventional training at that point left the wings unprepared, especially the units under 8th Air Force. The nuclear inspection process was well established and provided an effective way to assess a wing's ability to accomplish its mission, because it focused on putting bombs on the target. This drove all other training. Commanders knew they were accountable for executing the mission and measured and rewarded people according to their ability to accomplish the mission. Some units innovated and experimented to improve their conventional capabilities and this made a difference in the Persian Gulf War.

Combat experiences in Operation Desert Storm revealed that some bombers were prepared for the mission, and some were not. Those that did well in combat had practiced high-altitude bombing and learned how to overcome system deficiencies. Their innovation continued during the war as they questioned combat results and identified that target coordinate error was causing them problems. For those that deployed in-theater, well before the start of the war, they were able to hone their conventional capabilities by conducting rehearsal sorties to resolve command and control, and package integration problems. One reason that some bombers did not do well while others did, notwithstanding a lack of training, was due to the fact that they did not share lessons learned. There is really little explanation as to why this was the case, since SAC could have distributed conventional bombing lessons before the war, and the bomber crewmembers could have spoken to each other over the phone. These types of problems were mostly worked out by the time bombers were again needed in 2001.

With the dissolution of SAC, and a large growth in conventional requirements, the focus of the nuclear bomber force gradually shifted in favor of the conventional mission, and to the detriment of the nuclear

mission. This was not evident until the last of the SAC-trained alert bomber crews finally retired. At the same time, and in support of this shift in focus, the inspection regime supported this change. Inspections, which were still used by senior leaders as a way to measure and assess unit readiness, began to focus on mission preparation activities versus actual mission results. This change is not without due cause, since advances in technology made the nuclear mission relatively more easy to perform, but did not alleviate the force of its need to focus on nuclear procedures.

To solve this balancing problem, the USAF should commit to fully resourcing the nuclear mission to the level of the requirements levied by US Strategic Command. At the same time, nuclear bomber wings must ensure their training processes focus on teaching nuclear procedures. Expected standards of performance in the mission have eroded over the years, because the mission became focused on how to not be used versus how to execute the mission. To support the change in focus that is required, the inspection regime needs to adjust as well. Presently, there is a mismatch between the stated requirements, what the USAF is resourcing, and then how commanders measure mission accomplishment. Until those are resolved, the bombers will continue to suffer from an imbalance. However, this is not the only balancing problem at hand.

Some of the vignettes presented in this paper show that leaders accepted responsibility for their mission and were given the leeway to adjust training and readiness in accordance with the contextual demands of their time. Over time, those useful training processes became less flexible and more scientifically managed in terms of producing numbers. Leadership was no longer required, simply enabling the machine-like process of producing bomber crew members while meeting training metrics. The fix then seems to be a return to the flexibility those previous commanders exhibited. With the exception of

the 2 BW that had a dual-DOC mission prior to the Persian Gulf War, no other commander had to execute both a nuclear and conventional mission simultaneously, to equally, and high, proficiency levels. Why should today's leaders be expected to accomplish this monumental task with even fewer resources? If the mission demands that the bomber force must maintain its present path of performing both missions, then they deserve the utmost support from the USAF, and USSTRATCOM chains of command. USSTRATCOM should continue to improve the command and control process used by nuclear crews. Additionally, USSTRATCOM can take advantage of a unified nuclear enterprise by setting the pace for command-wide inspections and deployment rotations to allow local commanders the time necessary to refocus on the mission at hand. The USAF should ensure that training focuses on those most complex areas of weapons employment. For the nuclear mission, cruise missile targeting and re-targeting is the most complex aspect of the mission, notwithstanding the command and control deficiencies. Fortunately, the USAF can adjust to this need, in spite of flight hour reductions, by allowing missile retargeting activity to occur in synthetic training devices which mimic actual flight conditions. For conventional weapons, being able to conduct on-the-fly dynamic targeting scenarios is best suited to in-flight training to account for actual terrain and airspace conditions that are not easily represented in synthetic training devices.

Balancing means a person applies the proper amount of resources towards accomplishing a task. One person cannot tell another to balance a situation without providing some means for that person, or organization, to prioritize which tasks are more important. If all tasks are equal in importance, then balancing should be easy by simply applying equal amounts of resources to each task. Or, that could mean applying the amount of resources required of each task, but this assumes there are enough resources to source all of the requirements.

Strategic bombers are global strike power projection instruments. They might employ different types of weapons, but their effect is the same. They penetrate hostile airspace either through stealth or standoff weapons, in order to strike targets with precision, utilizing conventional or nuclear munitions. The United States can be assured of these bombers' capabilities when they are measured appropriately.

It is quite difficult to solve the overall problem of how dual-role bombers can find a balance between the nuclear and conventional missions. Doing so requires finding the right match between requirements and capabilities. The B-52 force is ready and willing to handle whatever mission it is asked to perform, but that force also needs to be provided the resources to prepare for the mission, and also needs a way to prioritize among competing requirements. This research paper barely covers several topics on which there is plenty of opportunity for further research. Two questions that remain difficult to answer are "how many missions can one unit handle?" and "when will a unit cease to function?" A comparative study of manning, flight hours, sortie generation capability, bomb scores, bomber experience-mix, crew ratios, and training events would be a good start in answering what is possible, and how much is too much.

Fortunately, the new leaders in the nuclear enterprise recognize the opportunities facing them and are taking the necessary steps to find balance. Already, many of the suggestions in this paper are being implemented by US Strategic Command, the USAF, and Air Force Global Strike Command. In November 2010, Air Force Global Strike Command released a command training plan offering a training-focus priority list. This training plan is an excellent start and needs to extend to organizations above Air Force Global Strike Command to address some of the competing requirements the USAF must fulfill. Additionally, the command is rewriting unit Designed Operational Capability statements and training guidance to focus on specific requirements versus satisfying

a broad demand for a capability. US Strategic Command is examining ways to improve the command and control process while also integrating bombers into realistic training scenarios. Headquarters Air Force, specifically the A10 nuclear deterrence directorate, is examining ways to improve readiness through training. Finally, the inspection community is critically examining the inspection process to provide senior leaders with a thorough assessment of unit capability without detracting from the bomber mission. These organizations are taking the proper approach to finding balance for dual-role bombers. Ultimately, policy makers need to articulate what they need from nuclear-capable bombers so that the bomber force can adjust its force structure and modify training processes to meet that need.

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